



# NASA THESAURUS SUPPLEMENT

A three-part cumulative update of the  
1998 edition of the *NASA Thesaurus*

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A three-part cumulative update of the  
1998 edition of the *NASA Thesaurus*

**National Aeronautics and  
Space Administration**

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Available from:

NASA Center for AeroSpace Information  
7121 Standard Drive  
Hanover, MD 21076-1320

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# Introduction

This Supplement is a cumulative update to the 1998 edition of the *NASA Thesaurus* (NASA/SP—1998–7501). The update includes all new terms and associated hierarchies added between the cut-off for the 1998 edition (December 1997) through January 31, 2001. Parts 1 and 2 of this *Supplement* correspond to Volumes 1 and 2 of the printed edition of the *NASA Thesaurus*. Supplements are normally published every six months.

**Part 1** (*Hierarchical Listing*) contains the full hierarchical structure for each new term along with all new cross references and term definitions.

Display elements comprising the hierarchical listing are as follows:

Display Element	Notation
Generic Structure .....	GS
Related Term .....	RT
Use .....	USE
Use For .....	UF
Scope Note .....	SN
Definition .....	DEF
Array Terms .....	∞

For a fuller explanation, see the Introduction (pages viii–xi) in the printed version of the 1998 *NASA Thesaurus*, Volume 1.

**Part 2** (*Rotated Term Display*) is a ready reference tool which provides additional ‘access points’ to the thesaurus terminology. It contains the postable terms and nonpostable cross references found in the Hierarchical Listing (Part 1) arranged in a KWIC (key-word-in-context) index.

**Part 3** (*Changes*) is a listing of deletions or changes to postable terms or USE references made since the 1998 edition of the *NASA Thesaurus*. To control the size of the Supplement, only significant changes in term hierarchies and related term lists are presented.

NOTE: Other resources and products related to the NASA Thesaurus can be found at the following URL:  
**<http://www.sti.nasa.gov/thesfrm1.htm>**.

In addition to the above mentioned resources, a thesaurus listserv has been set up for submitting candidate terms and discussion of related lexicographical issues. A listing of candidate and accepted new terms is posted monthly. To subscribe to this listserv, send an e–mail message to **[listserv@sti.nasa.gov](mailto:listserv@sti.nasa.gov)**. Leave the subject line blank and in the message section, type **SUBSCRIBE THESAURUS–L <Your name>**. (Should you wish to cancel your subscription, send a message to the same address with UNSUBSCRIBE in the message section.)

Comments and suggestions regarding the NASA Thesaurus should be directed to:

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NASA Center for AeroSpace Information  
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Telephone: (301) 621–0114





# NASA THESAURUS SUPPLEMENT

## PART 1 HIERARCHICAL LISTING

### A

#### ACE satellite

USE **Advanced Composition Explorer**

#### Advanced Composition Explorer

(added December 1999)

DEF Explorer spacecraft (launched August 25, 1997) carrying six high-resolution sensors and three monitoring instruments for sampling low-energy particles of solar origin and high-energy galactic particles. From a vantage point approximately 1/100 of the distance from the Earth to the Sun, the Advanced Composition Explorer (ACE) can perform measurements over a wide range of energy and nuclear mass, under all solar wind flow conditions and during both large and small particle events including solar flares. When reporting space weather ACE can provide an advance warning of geomagnetic storms.

- UF *ACE satellite*
- Explorer 71 satellite*
- GS artificial satellites
  - . scientific satellites
  - . . . Explorer satellites
  - . . . **Advanced Composition Explorer**
- RT energetic particles
  - galactic cosmic rays
  - interplanetary medium
  - solar corpuscular radiation
  - solar cosmic rays
  - solar wind
  - space weather

#### aeroshells

(added May 1999)

DEF Aerodynamic structural shells that attach to, or comprise a portion of, the exterior of an aerospace vehicle or space probe; especially such structures that support atmospheric entry, aerobraking, aeroassist, or hypersonic flight.

- GS aerodynamic configurations
  - . **aeroshells**
- RT aeromaneuvering
  - nose cones
  - reentry vehicles
  - spacecraft design
  - spacecraft shielding
  - spacecraft structures

#### Alpha Magnetic Spectrometer

(added June 1998)

- UF *AMS (spectrometer)*
- GS measuring instruments
  - . spectrometers
  - . . . **Alpha Magnetic Spectrometer**
- RT antimatter
  - Cerenkov counters
  - cosmic rays
  - dark matter
  - International Space Station
  - interstellar matter
  - magnetic spectroscopy
  - space station payloads
  - spaceborne astronomy

#### AM-1 (EOS) spacecraft

USE **Terra spacecraft**

#### AMS (spectrometer)

USE **Alpha Magnetic Spectrometer**

#### anisoplanatism

(added May 1999)

DEF In adaptive optics (AO) systems, a performance-degrading effect that arises whenever light from the wave-front sensor beacon and light from the target object sample different volumes of optical turbulence. This effect results in an increased value of the aperture-averaged residual phase variance after AO compensation, which causes an exponential decrease in system performance.

- RT aberration
  - adaptive optics
  - atmospheric correction
  - atmospheric optics
  - image resolution
  - optical correction procedure
  - phase error
  - telescopes

#### antenna gain

(added June 1998)

- GS amplification
  - . **antenna gain**
- RT antennas
  - automatic gain control
  - directional antennas
  - effectiveness
  - high gain
  - signal reception

#### anticoincidence detectors

(added August 2000)

DEF Detectors and related systems that differentiate ambient background noise from signals of interest by identifying unwanted input signals that co-occur in time with other signals. Often used with gamma-ray detection systems.

- UF *anticoincidence shields*
- RT background radiation
  - coincidence circuits
  - comparators
  - counting circuits
  - ∞ detectors
    - discriminators
    - gamma ray spectrometers
    - hodoscopes
    - particle telescopes
    - proportional counters
    - radiation counters
    - scintillation counters
    - signal detectors
    - trigger circuits

#### anticoincidence shields

USE **anticoincidence detectors**

#### antiphase boundaries

(added March 1998)

- UF *antiphase domains*
- APB (materials)*
- GS boundaries
  - . **antiphase boundaries**
- RT binary alloys
  - crystal dislocations

crystal lattices  
crystal structure  
grain boundaries  
interfacial energy  
intermetallics  
microstructure  
order-disorder transformations  
solid solutions  
solid-solid interfaces  
superlattices  
ternary alloys

#### antiphase domains

USE **antiphase boundaries**

#### APB (materials)

USE **antiphase boundaries**

#### apoptosis

(added October 2000)

DEF One of the two mechanisms by which cell death occurs (the other being the pathological process of NECROSIS). Apoptosis is the mechanism responsible for the physiological deletion of cells and appears to be intrinsically programmed. It is characterized by distinctive morphologic changes in the nucleus and cytoplasm, chromatin cleavage at regularly spaced sites, and the endonucleolytic cleavage of genomic DNA at internucleosomal sites. This mode of cell death serves as a balance to mitosis in regulating the size of animal tissues and in mediating pathologic processes associated with tumor growth.

- UF *programmed cell death*
- GS physiological effects
  - . **apoptosis**
- RT biological effects
  - cells (biology)
  - cytology
  - death
  - deoxyribonucleic acid
  - necrosis
  - radiation effects

#### archaeomagnetism

USE **paleomagnetism**

#### associative memory

(added December 1999)

DEF A method or device for data storage in which data is identified by a part or properties of its content, rather than by an address or relative position.

- UF *associative storage*
- content-addressable memory*
- GS memory (computers)
  - . **associative memory**
- RT associative processing (computers)
  - computer storage devices
  - neural nets
  - optical memory (data storage)

#### associative storage

USE **associative memory**

#### automatic indexing

USE **indexing (information science)**

## B

### bevel gears

(added May 1999)

- GS gears
  - . bevel gears
  - . . spiral bevel gears
- RT gear teeth

### biomass burning

(added December 1999)

DEF Burning of vegetation in forests, grasslands, and agricultural lands usually carried out to clear the land and change its use; a significant contributor to the global budgets of many radiatively and chemically active gases and particulates in the atmosphere.

- GS combustion
  - . biomass burning
- RT air pollution
  - climate change
  - combustion products
  - contaminants
  - deforestation
  - environment pollution
  - forest fires
  - man environment interactions
  - smoke

### biomimetics

(added October 2000)

DEF The study of biological systems as models for the development of synthetic materials, devices, sensors, and processes.

- RT biochemistry
  - bioengineering
  - biological models (mathematics)
- ∞ biology
  - bionics
  - cybernetics
  - smart materials
  - smart structures

### Biot–Savart law

(added August 1998)

DEF Law describing the intensity of a magnetic field produced by a current carrying wire. Also applied in fluid dynamics to describe the flow–velocity field induced by a vortex.

- GS laws
  - . Biot–Savart law
- RT electromagnetism
  - flow velocity
  - magnetic fields
  - Maxwell equation
  - vortices

### Boeing 717 aircraft

(added October 1998)

- GS Boeing aircraft
  - . Boeing 717 aircraft
  - commercial aircraft
  - . Boeing 717 aircraft
  - jet aircraft
  - . turbofan aircraft
  - . . Boeing 717 aircraft
  - monoplanes
  - . Boeing 717 aircraft
  - passenger aircraft
  - . Boeing 717 aircraft
  - transport aircraft
  - . Boeing 717 aircraft
- RT ∞ aircraft

### bohrium

(added May 1998)

- GS chemical elements
  - . bohrium
- RT hassium
  - seaborgium

### Bond number

(added December 1999)

DEF Dimensionless number representing the ratio between gravitational force and the surface tension of a bubble, drop, or meniscus.

- GS dimensionless numbers
  - . Bond number
- RT drops (liquids)
  - gravitational effects
  - interfacial tension
  - menisci

## C

### carrier sense multiple access

(added April 2000)

DEF A data transmission protocol for multi-access networks where each node in the network senses traffic and waits for it to clear before transmitting; if two or more nodes transmit simultaneously, they wait a random interval before attempting to re-transmit.

- GS protocol (computers)
  - . carrier sense multiple access
  - telecommunication
  - . multiple access
  - . . carrier sense multiple access
  - transmission
  - . signal transmission
  - . . data transmission
  - . . . multiple access
  - . . . . carrier sense multiple access
- RT communication networks
  - computer networks
  - Ethernet
  - local area networks
  - packet transmission

### cascode devices

(added August 1998)

DEF Amplifier devices consisting of a common grounded–emitter (cathode) or source stage that drives a grounded–base output stage, resulting in high–impedance, high–gain, and low–noise,

- GS amplifiers
  - . cascode devices
  - electronic equipment
  - . solid state devices
  - . . semiconductor devices
  - . . . cascode devices
- RT CMOS
  - field effect transistors
  - high electron mobility transistors
  - switching circuits
  - transistor amplifiers
  - transistor circuits
  - transistors

### cellular manufacturing

USE group technology (manufacturing)

### chain reactions (chemistry)

(added May 1999)

- GS chemical reactions
  - . chain reactions (chemistry)

- RT chemical lasers
  - combustion chemistry

### chain reactions (nuclear physics)

(added May 1999)

- GS nuclear reactions
  - . nuclear fission
  - . . chain reactions (nuclear physics)
- RT fission products
  - neutrons

### Chandra X Ray Astrophysics Facility

USE X Ray Astrophysics Facility

### clamped structures

(added February 1998)

- RT beams (supports)
  - clamps
  - composite structures
  - joints (junctions)
  - laminates
  - plates (structural members)
  - shells (structural forms)
  - structural members
  - structural vibration
- ∞ structures

### clinorotation

(added July 2000)

DEF Rotational motion of a test subject about one or more axes that are inclined with respect to the gravitational vector; often applied to simulate a microgravity environment.

- UF clinostat rotation
  - clinostating
- GS gyration
  - . rotation
  - . . clinorotation
- RT centrifuging
  - clinostats
  - gravitational effects
  - gravitational physiology
  - microgravity
  - rotating environments
  - space environment simulation
  - weightlessness
  - weightlessness simulation

### clinostat rotation

USE clinorotation

### clinostating

USE clinorotation

### clinostats

(added July 2000)

DEF Devices for producing vector–averaged gravitational environments which mimic microgravity.

- UF random positioning machines
- GS simulators
  - . environment simulators
  - . . space simulators
  - . . . clinostats
- RT bioreactors
  - centrifuges
  - clinorotation
  - gravitational effects
  - gravitational physiology
  - microgravity
  - rotating environments
  - space environment simulation
  - tissue engineering
  - weightlessness simulation

**cloud-to-cloud discharges**

(added August 1999)

- GS electric current
  - . electric discharges
  - . . lightning
  - . . . **cloud-to-cloud discharges**

**cloud-to-ground discharges**

(added August 1999)

- GS electric current
  - . electric discharges
  - . . lightning
  - . . . **cloud-to-ground discharges**
- RT elves
  - . sprites (atmospheric physics)

**CMBR (astronomy)**

- USE **cosmic microwave background radiation**

**cochannel interference**

(added April 2000)

DEF Interference caused by multiple, simultaneous transmissions occurring in the same communication channel.

- GS electromagnetic interference
  - . radio frequency interference
  - . . **cochannel interference**
- RT channel capacity
  - . channel noise
  - . intersymbolic interference
  - . phase shift keying

**Comet Nucleus Tour**

(added February 1999)

DEF A NASA Discovery-class mission to acquire imagery and comparative spectral maps of comet nuclei and analyze comet dust flows. The mission spacecraft will fly to within 100 kilometers of at least three near-Earth comets including Comet Encke, Comet Schwassmann-Wachmann, and Comet d'Arrest.

- UF **CONTOUR (mission)**
- GS space missions
  - . flyby missions
  - . . **Comet Nucleus Tour**
- RT comet nuclei
  - . Encke comet
  - . Schwassmann-Wachmann comet
  - . swingby technique

**content-addressable memory**

- USE **associative memory**

**CONTOUR (mission)**

- USE **Comet Nucleus Tour**

**Cooper-Harper ratings**

(added August 1999)

- GS flight characteristics
  - . pilot ratings
  - . . **Cooper-Harper ratings**
  - . ratings
  - . . pilot ratings
  - . . **Cooper-Harper ratings**
- RT aircraft performance
  - . helicopter performance

**corrugated waveguides**

(added February 1998)

- GS waveguides
  - . **corrugated waveguides**
- RT gratings (spectra)
  - . optical waveguides
  - . waveguide antennas

**cosmic microwave background radiation**

(added July 2000)

- UF **CMBR (astronomy)**
- GS electromagnetic radiation
  - . radio waves
  - . . extraterrestrial radio waves
  - . . . **cosmic microwave background radiation**
  - . . short wave radiation
  - . . . microwaves
  - . . . . **cosmic microwave background radiation**
  - . extraterrestrial radiation
    - . extraterrestrial radio waves
    - . . **cosmic microwave background radiation**
- RT cosmology
  - . radio astronomy
  - . relic radiation
  - . Sunyaev-Zeldovich effect

**cosmions**

- USE **weakly interacting massive particles**

**cost benefit analysis**

- USE **cost analysis**
- cost effectiveness**

**critical current**

(added December 1999)

DEF A current value in a superconductive material, at a particular constant temperature and in the absence of a magnetic field, below which the material is superconducting and above which the material behaves normally.

- GS electric current
  - . **critical current**
- RT critical temperature
  - . current density
  - . superconductivity
  - . superconductors (materials)

**cuprates**

(added April 1999)

- GS copper compounds
  - . **cuprates**
- RT BSCCO superconductors
  - . copper oxides
  - . YBCO superconductors

**cycloaddition**

(added June 1998)

DEF Pericyclic chemical reaction in which unsaturated molecules combine to form a cyclic compound under the influence of heat or light.

- GS chemical reactions
  - . **cycloaddition**
  - . . Diels-Alder reactions
- RT cyclic compounds
  - . photochemical reactions
  - . polymerization
  - . synthesis (chemistry)

**D****Darkstar unmanned aerial vehicle**

- USE **plotless aircraft**
- reconnaissance aircraft**

**data mining**

(added April 2000)

- DEF The extraction of patterns from large

data sets in order to discover previously unknown and potentially useful information.

- UF **knowledge discovery**
- knowledge extraction**
- GS data processing
  - . **data mining**
  - . information analysis
  - . **data mining**
- RT cluster analysis
  - . data retrieval
  - . machine learning
  - . trend analysis

**Deep Space 1 Mission**

(added October 1998)

DEF First of several technology demonstration missions supporting the NASA New Millennium Program. Advanced technologies include an ion propulsion system, solar concentrator arrays, autonomous navigation and control systems, an integrated camera and imaging spectrometer, and several telecommunications and microelectronics devices. The mission plan includes a flyby of Asteroid 1992 KD.

- UF **DS1 (space mission)**
- GS space missions
  - . **Deep Space 1 Mission**
- RT asteroid missions
  - . autonomous navigation
  - . flyby missions
  - . interplanetary spacecraft
  - . ion propulsion
  - . NASA space programs
  - . solar electric propulsion

**deformable mirrors**

(added May 1998)

- GS mirrors
  - . **deformable mirrors**
- RT adaptive optics
  - . light modulation
  - . phase modulation
  - . segmented mirrors

**Delta 3 launch vehicle**

(added October 1998)

- GS launch vehicles
  - . Delta launch vehicle
  - . . **Delta 3 launch vehicle**

**Delta 4 launch vehicle**

(added October 1998)

- GS launch vehicles
  - . Delta launch vehicle
  - . . **Delta 4 launch vehicle**

**dendrimers**

(added October 2000)

DEF A class of polymeric macromolecules characterized by a regular highly-branched molecular architecture resembling a spherical starburst, and a synthesis process that permits nearly complete control over critical molecular design parameters, such as size, shape, surface/interior chemistry, flexibility, and topology. Because of these characteristics, dendrimers are seen as important elements in the manufacture of nanoscale materials and devices.

- UF **dendritic polymers**
- hyperbranched polymers**
- GS molecules
  - . macromolecules
  - . . **dendrimers**
- RT conducting polymers
  - . dendritic crystals
  - . nanostructure (characteristics)

## dielectric loss

- organometallic polymers
- ∞ polymers
- synthetic metals

### dendritic polymers

- USE **dendrimers**

## dielectric loss

(added April 2000)

DEF The electric energy that is converted into heat in a dielectric material subjected to a changing electric field.

- GS electrical properties
  - . dielectric properties
  - . . **dielectric loss**
  - losses
  - . **dielectric loss**
- RT dielectrics
- energy dissipation
- permittivity

## dielectric waveguides

(added February 1998)

- GS waveguides
  - . **dielectric waveguides**
- RT dielectrics
- microwave transmission
- optical waveguides
- waveguide antennas
- waveguide filters

## differential games

(added October 1998)

- GS games
  - . **differential games**
- RT minimax technique
- optimal control
- pursuit–evasion games
- stochastic processes
- zero sum games

## digital cameras

(added July 1998)

- GS optical equipment
  - . cameras
  - . . **digital cameras**
  - photographic equipment
  - . cameras
  - . . **digital cameras**
- RT CCD cameras
- digital systems
- digital techniques
- photogrammetry
- television cameras
- video equipment

### document indexing

- USE **indexing (information science)**

### DS1 (space mission)

- USE **Deep Space 1 Mission**

## dubnium

(added May 1998)

- GS chemical elements
  - . **dubnium**
- RT rutherfordium
- seaborgium

# E

### EAM (physical chemistry)

- USE **embedded atom method**

### EAP (polymers)

- USE **electroactive polymers**

### e-commerce

- USE **electronic commerce**

### ekranoplanes

- USE **wing-in-ground effect vehicles**

## electroactive polymers

(added June 2000)

- UF **EAP (polymers)**
- RT actuators
- conducting polymers
- electromechanical devices
- electrorheological fluids
- electrostriction
- microelectromechanical systems
- ∞ polymers
- robot arms

## electrochemical synthesis

(added January 2000)

DEF A chemical synthesis reaction that is induced by an electric current.

- UF **electrosynthesis**
- GS synthesis (chemistry)
- . **electrochemical synthesis**
- RT electrochemistry
- electrolysis
- polymerization

## electronic commerce

(added April 2000)

DEF The buying and selling of goods and services via the Internet or other computer communications network.

- UF **e-commerce**
- GS commerce
- . **electronic commerce**
- RT computer information security
- electronic mail
- Internet resources
- World Wide Web

## electronic structure

(added April 1999)

- SN (THE TERM "ATOMIC STRUCTURE" WAS USED FOR THIS CONCEPT PRIOR TO MAY 1999)
- RT atomic structure
- band structure of solids
- electron energy
- electron orbitals
- electron states
- energy bands
- energy gaps (solid state)
- energy levels
- Fermi liquids

### electrosynthesis

- USE **electrochemical synthesis**

## elves

(added January 2000)

DEF Transient air glow events observed near 90 km, nearly simultaneously with a strong cloud-to-ground lightning stroke. They often precede sprites, which may occur at lower altitudes a few milliseconds later. It is believed that elves are the result of wave heating by very low frequency (VLF) radio pulses emitted by the lightning discharge current.

- GS atmospheric radiation
- . sky radiation
- . . **elves**
- electromagnetic radiation

. light (visible radiation)

. . sky radiation

. . . **elves**

- RT atmospheric electricity
- atmospheric ionization
- cloud-to-ground discharges
- lightning
- sprites (atmospheric physics)
- thunderstorms

### e-mail

- USE **electronic mail**

## embedded atom method

(added February 1998)

DEF A semiempirical calculation method developed by Daw and Baskes for determining the energetics of atoms in a bulk environment. The original form of the method was based on density functional theory and was intended primarily for tight-packed transition metals. More recent modifications have extended the applicability of the method to a large number of elements in the periodic table.

- UF **EAM (physical chemistry)**
- MEAM (physical chemistry)**
- modified embedded atom method**
- RT alloys
- crystal defects
- grain boundaries
- interatomic forces
- metals
- ∞ methodology
- molecular dynamics
- potential energy

### enantiomeric compounds

- USE **enantiomers**

## enantiomers

(added August 1998)

DEF Isomeric pairs whose crystalline forms or molecular structures are non-superimposable mirror images.

- UF **enantiomeric compounds**
- enantiomorphs**
- GS isomers
- . **enantiomers**
- RT chirality
- crystal structure
- isomorphism
- molecular structure
- stereochemistry
- symmetry

### enantiomorphs

- USE **enantiomers**

## environmental cleanup

(added February 1999)

- GS cleaning
- . **environmental cleanup**
- RT decontamination
- environment management
- environment protection
- hazardous wastes
- oil pollution
- oil slicks
- pollution control
- reclamation
- soil pollution
- waste disposal
- waste treatment
- water pollution
- water treatment

## Envisat-1 satellite

(added August 2000)

DEF Polar-orbiting Earth observation satellite designed to provide continuous global measurements including high- and medium-resolution radar and optical images from its Advanced Synthetic Aperture Radar (ASAR) and Medium-Resolution Imaging Spectrometer (MERIS). Acquired data will support Earth science research and allow monitoring of environmental and climatic changes.

- GS artificial satellites
  - . ESA satellites
  - . . **Envisat-1 satellite**
  - ESA spacecraft
  - . ESA satellites
  - . . **Envisat-1 satellite**
- RT ERS-2 (esa satellite)
  - imaging spectrometers
  - remote sensing
  - satellite observation
  - satellite-borne radar
  - synthetic aperture radar

## EOS AM-1 spacecraft

USE **Terra spacecraft**

## Ethernet

(added January 2000)

DEF Computer network protocol originally developed in the 1970s for local area network technology; uses carrier sense multiple access with collision detection (CSMA/CD), coaxial cable, and broadcast transmission.

- GS protocol (computers)
  - . **Ethernet**
- RT carrier sense multiple access
  - computer networks
  - local area networks

## Euler-Bernoulli beam theory

USE **Euler-Bernoulli beams**

## Euler-Bernoulli beams

(added April 1998)

- UF *Euler-Bernoulli beam theory*
- GS structural members
  - . beams (supports)
  - . . **Euler-Bernoulli beams**
- RT axial strain
  - bending
  - bending vibration
  - dynamic structural analysis
  - elastic properties
  - mathematical models
  - partial differential equations
  - structural analysis
  - Timoshenko beams

## evanescent waves

(added March 1998)

- GS surface waves
  - . **evanescent waves**
- RT acoustic impedance
  - evanescence
  - fiber optics
  - internal waves
  - plane waves
  - propagation modes
  - reflected waves
  - wave propagation
- ∞ waves

## exergic energy

USE **exergy**

## exergy

(added December 2000)

DEF The maximum amount of external-energy that could be drawn from a system or form of energy in relation to a certain reference environment. Exergy is not considered to be a form of energy but a designation of the quality of energy.

- UF *exergic energy*
- RT ∞ energy
  - energy budgets
  - energy conservation
  - energy conversion efficiency
  - energy dissipation
  - entropy
  - power efficiency
  - thermodynamic efficiency
  - thermodynamic properties
  - thermodynamics
  - waste energy utilization

## Explorer 71 satellite

USE **Advanced Composition Explorer**

## Explorer 73 satellite

USE **Transition Region and Coronal Explorer**

## Explorer 74 satellite

USE **Submillimeter Wave Astronomy Satellite**

## Explorer 77 satellite

USE **Far UV Spectroscopic Explorer**

## Explorer 78 satellite

USE **IMAGE satellite**

# F

## FDTD (mathematics)

USE **finite difference time domain method**

## ferroelastic materials

(added June 1998)

- GS **ferroelastic materials**
  - . shape memory alloys
  - . . nitinol alloys
- RT ceramics
  - ferroelasticity
  - ferroelectric materials
- ∞ materials
  - smart materials

## ferroelasticity

(added June 1998)

- GS mechanical properties
  - . elastic properties
  - . . **ferroelasticity**
- RT crystal structure
  - domain wall
  - ferroelastic materials
  - ferroelectricity
  - phase transformations
  - shape memory alloys
  - smart materials

## fiber pushout

(added September 1999)

- GS releasing
  - . **fiber pushout**
- RT ceramic matrix composites
  - composite materials
  - debonding (materials)

- destructive tests
- failure modes
- fiber composites
- fiber pullout
- fiber-matrix interfaces
- fibers
- interfacial energy
- ∞ materials tests
- metal matrix composites
- reinforcing fibers

## field tests

(added November 1998)

- SN (EXCLUDES TESTS OF ELECTRIC, MAGNETIC, OR ELECTROMAGNETIC FIELDS)
- DEF Tests carried out in the actual setting in which the subject device is intended to operate.
- RT environmental tests
  - performance tests
- ∞ tests

## field-programmable gate arrays

(added April 2000)

- GS circuits
  - . gates (circuits)
  - . . **field-programmable gate arrays**
  - . integrated circuits
  - . . **field-programmable gate arrays**
  - programmable logic devices
  - . **field-programmable gate arrays**

## finite difference time domain method

(added April 1999)

- UF *FDTD (mathematics)*
- GS analysis (mathematics)
  - . numerical analysis
  - . . approximation
  - . . . finite difference theory
  - . . . . **finite difference time domain method**
  - . . time domain analysis
  - . . **finite difference time domain method**
- RT computational electromagnetics
  - electromagnetic scattering

## flow noise

(added March 2000)

DEF Noise produced by the flow of fluids around or through a body; the pressure variations associated with a turbulent flow field.

- GS elastic waves
  - . sound waves
  - . . noise (sound)
  - . . . **flow noise**
  - . . . . aerodynamic noise
  - . . . . . blade slap noise
  - . . . . . propeller noise
  - . . . . . screech tones
- RT aeroacoustics
  - ducted flow
  - nozzle flow
  - pipe flow
  - underwater acoustics

## free-space optical communication

(added June 1998)

- GS telecommunication
  - . communication
  - . . optical communication
  - . . . **free-space optical communication**
- RT high power lasers
  - laser beams
  - satellite communication
  - space communication

## free-space optical interconnects

### free-space optical interconnects

(added June 1998)

UF *FSOI (integrated optics)*

GS optical interconnects  
. **free-space optical interconnects**

RT integrated optics  
interprocessor communication  
optical computers  
optical switching  
optoelectronic devices  
photonics

### frequency domain analysis

(added April 1999)

GS analysis (mathematics)

. **frequency domain analysis**

RT control systems design  
dynamic response  
frequency response  
parameter identification  
signal processing

*FSOI (integrated optics)*

USE **free-space optical interconnects**

### fullerides

(added February 1998)

GS carbon compounds

. **fullerides**

RT  $\infty$  alkali metal compounds  
 $\infty$  chemical compounds  
doped crystals  
fullerenes  
superconductors (materials)

*FUSE (satellite)*

USE **Far UV Spectroscopic Explorer**

*fuselage-wing stores*

USE **wing-fuselage stores**

### fusion propulsion

(added September 1999)

GS propulsion  
. nuclear propulsion  
. **fusion propulsion**

RT inertial confinement fusion  
nuclear electric propulsion  
nuclear fusion  
nuclear rocket engines  
plasma propulsion  
spacecraft propulsion

## G

### Gabor filters

(added February 1998)

GS image filters

. **Gabor filters**

RT computer vision  
 $\infty$  filters  
Gabor transformation  
image analysis  
image processing  
low pass filters  
neural nets  
spatial filtering  
textures

### Gabor transformation

(added February 1998)

GS transformations (mathematics)

. **Gabor transformation**

RT Fourier transformation  
Gabor filters

holography  
image processing  
signal analysis  
wavelet analysis

### games

(added October 1998)

GS **games**

. differential games  
. pursuit-evasion games  
. war games  
. zero sum games

RT control theory  
game theory  
optimization

### Genesis mission

(added February 1999)

DEF A space mission to collect solar wind samples from a halo orbit about the sun-Earth L1 point for two years, returning those samples to Earth in 2003 for analysis and examination. Analysis of the samples collected by the mission will contribute to an understanding of the origins of the solar system.

GS space missions

. **Genesis mission**

RT solar system evolution  
solar wind

### glucocorticoids

(added December 1999)

DEF Adrenocortical steroid hormones that are involved in the metabolism of fats, proteins, and carbohydrates, and have anti-inflammatory properties.

GS organic compounds  
. lipids  
. . . steroids  
. . . . corticosteroids  
. . . . **glucocorticoids**  
secretions  
. endocrine secretions  
. . hormones  
. . . corticosteroids  
. . . . **glucocorticoids**

RT adrenal gland  
atrophy  
carbohydrate metabolism  
hormone metabolisms  
hypokinesia  
lipid metabolism  
muscles  
protein metabolism

### Godunov method

(added February 1998)

DEF Non-oscillatory finite-volume scheme that incorporates the exact or approximate solution to the Riemann initial-value problem, or a generalization of it.

GS analysis (mathematics)  
. numerical analysis  
. . finite volume method  
. . . **Godunov method**  
procedures  
. finite volume method  
. . **Godunov method**

RT approximation  
Cauchy problem  
Cauchy-Riemann equations  
computational fluid dynamics  
Euler equations of motion  
finite difference theory  
shock wave interaction  
supersonic flow

### GOES 10

(added March 2000)

GS artificial satellites  
. meteorological satellites  
. . GOES satellites  
. . . **GOES 10**  
. . . synchronous satellites  
. . GOES satellites  
. . . **GOES 10**

### greedy algorithms

(added March 2000)

DEF Any algorithm characterized by a procedure that selects the most extreme element from a set to satisfy a given goal. A recursive procedure for constructing a set of objects from the smallest possible elements.

GS mathematical logic  
. algorithms  
. . **greedy algorithms**

RT graph theory  
heuristic methods  
minimax technique  
optimization

### group technology (manufacturing)

(added April 2000)

DEF A manufacturing methodology where production processes are organized into groups or cells based on similarities in the manufacturing requirements of product parts or production equipment capabilities.

UF *cellular manufacturing*

GS manufacturing  
. **group technology (manufacturing)**  
production engineering  
. **group technology (manufacturing)**  
RT computer aided manufacturing  
industrial management  
operations research  
process control (industry)  
production management

## H

### H-2 control

(added February 1998)

GS automatic control  
. optimal control  
. . **H-2 control**  
optimization  
. optimal control  
. . **H-2 control**  
RT control systems design  
control theory  
controllers  
feedback control  
H-infinity control  
linear quadratic Gaussian control

### Hale-Bopp comet

(added July 1998)

DEF Long-period comet discovered July 23, 1995; designated C/1995 O1.

GS celestial bodies  
. comets  
. . **Hale-Bopp comet**  
RT Oort cloud

### Hall resistance

(added July 2000)

DEF For a current-carrying conductor within a magnetic field, the ratio of the transverse voltage

induced by the Hall effect, to the conductor current.

- GS
  - electrical properties
  - . electrical impedance
  - . . . electrical resistance
  - . . . **Hall resistance**
  - impedance
  - . electrical impedance
  - . . . electrical resistance
  - . . . **Hall resistance**
- RT
  - electrical resistivity
  - Hall effect
  - magnetoresistivity
  - quantum Hall effect
- ∞
  - resistance
  - transport properties

### Hall thrusters

(added June 2000)

- GS
  - engines
  - . rocket engines
  - . . . electric rocket engines
  - . . . . electrostatic engines
  - . . . . **Hall thrusters**
- RT
  - electric propulsion
  - Hall accelerators
  - ion engines
  - plasma engines
  - spacecraft propulsion

### halon

(added January 2000)

DEF A bromofluorocarbon compound that was widely used as an agent for fire suppression and explosion protection. After being recognized as an ozone-depleting substance, the U.S. production and import of halons was banned in 1994.

- GS
  - carbon compounds
  - . halocarbons
  - . . **halon**
  - halogen compounds
  - . bromine compounds
  - . . **halon**
  - . . halocarbons
  - . . **halon**
- RT
  - fire extinguishers
  - flame retardants
  - fluorocarbons

### hardware-in-the-loop simulation

(added February 1999)

- UF
  - hardware-in-the-loop tests*
- GS
  - simulation
  - . **hardware-in-the-loop simulation**
- RT
  - computerized simulation
  - control simulation
  - performance tests
  - systems simulation

### hardware-in-the-loop tests

- USE **hardware-in-the-loop simulation**

### hassium

(added May 1998)

- GS
  - chemical elements
  - . **hassium**
- RT
  - bohrium
  - meitnerium

### head up tilt

(added March 1998)

DEF Body posture while lying on a tilt table with the head higher than the rest of the body.

- UF *HUT (physiology)*
- GS posture

- . **head up tilt**
- RT
  - aerospace medicine
  - bed rest
  - bioastronautics
  - cardiovascular system
  - gravitational physiology
  - head down tilt
  - hemodynamic responses
  - lower body negative pressure
  - orthostatic tolerance
  - physiological responses
  - supine position
  - weightlessness simulation

### heavy fermion superconductors

(added April 1999)

- GS
  - conductors
  - . superconductors (materials)
  - . . **heavy fermion superconductors**
  - intermetallics
  - . heavy fermion systems
  - . . **heavy fermion superconductors**

### heavy fermion systems

(added April 1999)

- GS
  - intermetallics
  - . **heavy fermion systems**
  - . . heavy fermion superconductors
- RT
  - fermions
  - superconductors (materials)

### heavy metals

(added July 1999)

DEF Metals or alloys having a high specific gravity; usually ones with a density greater than 5 grams per cubic centimeter.

- GS
  - metals
  - . **heavy metals**
- RT
  - cadmium
  - chromium
  - contaminants
  - copper
  - industrial wastes
  - lead (metal)
  - mercury (metal)
  - soil pollution
  - toxic hazards
  - zinc

### hindcasting

(added July 1999)

DEF The process of reconstructing the time and space evolution of an atmospheric or oceanic phenomenon that has occurred in the past, through an analysis of historical data, a mathematical-model simulation of the processes involved, or a combination of data analysis and modeling.

- GS
  - predictions
  - . **hindcasting**
- RT
  - forecasting
  - meteorological parameters
  - nowcasting
  - oceanographic parameters
  - weather forecasting

### HUT (physiology)

- USE **head up tilt**

### hybrid-Treftz finite element method

- USE **finite element method**
- Treftz method**

### hydrophobicity

(added June 2000)

DEF The degree to which a substance is insoluble in water, or resists wetting or hydration.

- GS
  - hygral properties
  - . **hydrophobicity**
- RT
  - adsorption
  - chemical properties
  - hydration
  - hygroscopicity
  - moisture resistance
- ∞
  - properties
  - solubility
  - sorption
  - surface properties
  - surfactants
  - waterproofing
  - wettability
  - wetting

### hyperbranched polymers

- USE **dendrimers**

### hypothetical particles

(added November 1999)

- GS
  - particles
  - . elementary particles
  - . . **hypothetical particles**
  - . . . gluons
  - . . . gravitinos
  - . . . gravitons
  - . . . partons
  - . . . quarks
  - . . . tachyons
  - . . . weakly interacting massive particles

### hypothetical planets

(added June 1998)

- UF
  - Phaethon (hypothetical planet)*
  - planet X*
  - transplutonic planets*
- GS
  - celestial bodies
  - . planets
  - . . **hypothetical planets**
- RT
  - comets
  - extrasolar planets
  - planetary orbits

I

### IMAGE satellite

(added November 2000)

DEF A medium class Explorer (MIDEX) mission to study the global response of the Earth's magnetosphere to changes in the solar wind. IMAGE (Imager for Magnetopause-to-Aurora Global Exploration) will use neutral atom, ultraviolet, and radio imaging techniques to: (a) identify the dominant mechanisms for injecting plasma into the magnetosphere on substorm and magnetic storm time scales; (b) determine the directly driven response of the magnetosphere to solar wind changes; and, (c) discover how and where magnetospheric plasmas are energized, transported, and subsequently lost during substorms and magnetic storms.

- UF
  - Explorer 78 satellite*
  - Imager for Magnetopause-to-Aurora Global Explorer*
- GS
  - artificial satellites
  - . scientific satellites
  - . . Explorer satellites

## In vitro methods and tests

... **IMAGE satellite**  
RT auroral zones  
Earth magnetosphere  
magnetic storms  
magnetopause  
plasmasphere  
space plasmas

*Imager for Magnetopause-to-Aurora Global Explorer*

USE **IMAGE satellite**

## In vitro methods and tests

(added May 1999)

DEF Tests of, or methods related to, biological or biochemical processes occurring in an artificial environment or outside of a living cell or organism.

RT bioassay  
biotechnology  
conditions  
culture techniques  
cytology  
fertilization  
histology  
in vivo methods and tests  
∞ methodology  
∞ tests  
tissue engineering

## In vivo methods and tests

(added May 1999)

DEF Tests of, or methods related to, biological or biochemical processes occurring within a living cell or organism.

RT bioassay  
biotechnology  
conditions  
culture techniques  
cytology  
histology  
in vitro methods and tests  
intravenous procedures  
∞ methodology  
∞ tests

## Indexing (information science)

(added April 2000)

DEF The representation of document content in a systematic, organized form to support information location, retrieval, or analysis.

UF *automatic indexing*  
*document indexing*  
*machine aided indexing*  
GS information analysis  
... **indexing (information science)**  
RT indexes (documentation)  
information management  
information retrieval  
terminology  
terms  
thesauri

*inflight simulation*

USE **in-flight simulation**

## In-flight simulation

(added October 1998)

DEF The use of a specialized test aircraft to simulate the flight characteristics of another vehicle. The test aircraft is typically capable of duplicating the computed responses of the simulated vehicle through special aerodynamic and control system features.

UF *inflight simulation*  
GS simulation  
... flight simulation

... **in-flight simulation**  
RT aircraft control  
flight characteristics  
flight control  
flight simulators  
flight tests  
training simulators

## Information analysis

(added April 2000)

GS **information analysis**  
... data mining  
... indexing (information science)  
... scientific visualization  
... numerical flow visualization  
... trend analysis  
RT information resources management  
information retrieval  
natural language processing

## Integrated Truss Structure Z1

(added June 2000)

DEF An early exterior framework for the International Space Station to allow the first U.S. solar arrays to be temporarily installed on the Unity module for early power.

UF **Z1 truss structure**  
GS space station structures  
... **Integrated Truss Structure Z1**  
RT International Space Station  
trusses  
Unity connecting module

## Intelligent materials

USE **smart materials**

## Interannual variations

USE **annual variations**

## Intercalibration

(added January 1999)

DEF Calibration between two or more data sources, including (1) the comparison of data sets acquired by different types of measurement systems for the purpose of deducing the calibration values for one of the measurement systems; (2) the mutual calibration of data from different measurement systems through the comparison of the data with model calculations; and (3) the calibration of multiple detectors on a single instrument through the comparison of data from each detector.

GS calibrating  
... **intercalibration**  
RT comparison  
correction  
multisensor applications  
standardization

## Intracloud discharges

(added August 1999)

GS electric current  
... electric discharges  
... lightning  
... **intracloud discharges**

## Intraseasonal oscillations

USE **intraseasonal variations**

## Intraseasonal variations

(added September 2000)

UF *intraseasonal oscillations*  
GS variations  
... periodic variations  
... **intraseasonal variations**  
... Madden-Julian Oscillation  
RT annual variations  
atmospheric circulation

atmospheric models  
climatology  
tropical meteorology

## Ion optics

(added June 1998)

RT beam waveguides  
beamforming  
electron optics  
ion beams  
ion engines  
ion propulsion  
mass spectrometers  
∞ optics

## Iridium network

(added December 1998)

DEF A 66-satellite wireless personal telecommunications network designed to provide worldwide telephone, paging, facsimile and data services to handheld or mobile equipment.

UF *Iridium satellites*  
GS networks  
... communication networks  
... **Iridium network**  
... satellite networks  
... satellite constellations  
... **Iridium network**  
RT communication satellites  
facsimile communication  
mobile communication systems  
satellite communication  
telephony  
wireless communication

## Iridium satellites

USE **communication satellites**  
**Iridium network**

## Iron aluminides

(added December 2000)

GS aluminum compounds  
... aluminides  
... **iron aluminides**  
iron compounds  
... **iron aluminides**  
RT aluminum alloys  
intermetallics  
iron alloys

## ISS (space station)

USE **International Space Station**

# J

## Java (programming language)

(added December 1998)

GS languages  
... programming languages  
... high level languages  
... **Java (programming language)**  
RT C++ (programming language)  
client server systems  
internets  
object-oriented programming  
World Wide Web

## Josephson effect

(added April 1999)

UF *Josephson tunneling*  
RT electron tunneling  
Josephson junctions  
SIS (superconductors)  
superconducting devices  
superconductors (materials)



*Josephson tunneling*  
USE **Josephson effect**

## K

### kink bands

(added March 1998)

RT buckling  
compression loads  
edge dislocations  
failure modes  
fiber composites  
microstructure  
plastic deformation  
reinforcing fibers  
single crystals

### kinking

(added April 1998)

RT bending  
buckling  
compression loads  
cracking (fracturing)  
deformation  
displacement  
failure modes  
fiber composites  
folding  
heaving  
twisting  
wrinkling

*knowledge discovery*

USE **data mining**

*knowledge extraction*

USE **data mining**

## L

*Laser Interferometer Gravitational-Wave Observatory*

USE **LIGO (observatory)**

*Laser Interferometer Space Antenna*

USE **LISA (observatory)**

### Laves phases

(added August 1998)

GS solid phases  
Laves phases  
RT alloys  
crystal lattices  
crystal structure  
cubic lattices  
interstitials  
microstructure  
phase transformations

### leaders (meteorology)

(added August 1999)

GS electric current  
electric discharges  
lightning  
leaders (meteorology)  
stepped leaders

### LIGO (observatory)

(added December 2000)

UF *Laser Interferometer Gravitational-Wave Observatory*  
GS antennas

gravitational wave antennas  
LIGO (observatory)  
observatories  
astronomical observatories  
LIGO (observatory)  
RT astronomical interferometry  
gravitational waves  
laser interferometry

### LISA (observatory)

(added December 2000)

UF *Laser Interferometer Space Antenna*  
GS antennas  
gravitational wave antennas  
LISA (observatory)  
artificial satellites  
scientific satellites  
astronomical satellites  
LISA (observatory)  
observatories  
astronomical observatories  
astronomical satellites  
LISA (observatory)  
RT astronomical interferometry  
gravitational waves  
laser interferometry  
spaceborne astronomy

### lithium batteries

(added December 1999)

GS electrochemical cells  
electric batteries  
lithium batteries  
lithium sulfur batteries  
RT storage batteries

### Long March launch vehicles

(added January 1999)

GS launch vehicles  
Long March launch vehicles  
RT Chinese space program  
Chinese spacecraft  
heavy lift launch vehicles

### Lunar Prospector

(added February 1998)

GS artificial satellites  
lunar satellites  
Lunar Prospector  
lunar spacecraft  
lunar satellites  
Lunar Prospector  
RT lunar composition  
lunar exploration  
lunar programs  
lunar resources  
lunar surface

## M

*machine aided indexing*

USE **indexing (information science)**

*MACHOs (astronomy)*

USE **massive compact halo objects**

### Madden-Julian Oscillation

(added September 2000)

DEF The most dominant and coherent component of the intraseasonal variability in the tropical atmosphere; characterized by a strong eastward propagation of atmospheric features, with a typical period of 30–60 days. The Madden-Julian Oscillation (MJO) may influence the tropical

climate and its short-term variability by modulating the timing and strength of El Nino – Southern Oscillation (ENSO) events, contributing to the mean heat budget of the western Pacific, and regulating the annual cycle of the tropical western Pacific, especially the Australian summer monsoon.

UF *MJO (meteorology)*

GS oscillations

Madden-Julian Oscillation

variations

periodic variations

intraseasonal variations

Madden-Julian Oscillation

RT air water interactions

annual variations

atmospheric circulation

atmospheric models

climatology

el Nino

monsoons

Southern Oscillation

tropical meteorology

zonal flow (meteorology)

### magnetars

(added January 2000)

DEF Highly magnetized neutron stars believed to emit quasi-steady x-rays along with bursts of soft gamma rays—emissions powered by their magnetic energy. According to the magnetar theory, these stars form in some fraction of all supernovae. When they are young (with ages less than about 10,000 years) magnetars may be observed as soft gamma repeaters (SGRs) or anomalous X-ray pulsars.

GS celestial bodies

stars

magnetic stars

magnetars

neutron stars

magnetars

RT pulsars

soft gamma repeaters

supernova remnants

x ray sources

### magnetic nozzles

(added September 1999)

DEF Nozzle devices used in some nuclear and plasma propulsion systems that utilize magnetic fields to direct and accelerate plasma flows, thereby providing thrust for propulsion.

RT coaxial plasma accelerators

electric rocket engines

nozzles

nuclear propulsion

nuclear rocket engines

plasma acceleration

plasma engines

plasma propulsion

rocket nozzles

spacecraft propulsion

VASIMR (propulsion system)

### magnetorheological fluids

(added September 2000)

DEF Fluids comprised of magnetically soft particles dispersed in liquids and possessing rheological properties that can be rapidly and reversibly altered by the application of a magnetic field.

RT electrorheological fluids

ferrofluids

ferromagnetic materials

fluids

## magnetostratigraphy

magnetic materials  
rheology  
smart materials  
vibration damping

### magnetostratigraphy

(added April 1999)

GS stratigraphy  
  . **magnetostratigraphy**  
RT geochronology  
  paleomagnetism

### markup languages

USE **document markup languages**

### Mars Climate Orbiter

(added March 1999)

DEF One of two spacecraft comprising the Mars Surveyor 98 program; launched December 1998. After obtaining a polar, nearly circular orbit around Mars, the Orbiter will serve as a radio relay during the Lander surface mission, then begin monitoring the atmosphere, surface, and polar caps for a complete Martian year. The Orbiter carries two science instruments: the Pressure Modulated Infrared Radiometer and the Mars Color Imager.

UF *Mars Surveyor 98 Orbiter*  
GS interplanetary spacecraft  
  . Mars probes  
  . . **Mars Climate Orbiter**  
  unmanned spacecraft  
  . space probes  
  . . Mars probes  
  . . . **Mars Climate Orbiter**  
RT Mars atmosphere  
  Mars missions  
  Mars Polar Lander  
  Mars surface  
  Mars Surveyor 98 Program

### Mars Global Surveyor

(added March 1999)

DEF Spacecraft and related mission designed to orbit Mars over a two year period and collect data on the surface morphology, topography, composition, gravity, atmospheric dynamics, and magnetic field. Launched November 1996.

UF *MGS (spacecraft)*  
GS interplanetary spacecraft  
  . Mars probes  
  . . **Mars Global Surveyor**  
  unmanned spacecraft  
  . space probes  
  . . Mars probes  
  . . . **Mars Global Surveyor**  
RT Mars atmosphere  
  Mars missions  
  Mars Observer  
  Mars surface

### Mars missions

(added February 1999)

GS space missions  
  . **Mars missions**  
  . . manned Mars missions  
  . . Mars sample return missions  
  . . Mars Surveyor 2001 Mission  
RT Earth–Mars trajectories  
  Mars Climate Orbiter  
  Mars exploration  
  Mars Global Surveyor  
  Mars landing  
  Mars Observer  
  Mars Pathfinder  
  Mars Polar Lander

Mars probes  
Mars surface samples  
Mars Surveyor 98 Program  
∞ missions  
  return to Earth space flight

### Mars Polar Lander

(added March 1999)

DEF One of two spacecraft comprising the Mars Surveyor 98 program; launched January 1999. After a soft landing near the Martian south pole, the Lander will search for near-surface ice and possible surface records of cyclic climate change, and characterize physical processes key to the seasonal cycles of water, carbon dioxide and dust on Mars. Prior to landing, the Deep Space 2 microprobes will be released as part of a technology-validation mission related to multiple-lander spacecraft.

UF *Mars Surveyor 98 Lander*  
GS interplanetary spacecraft  
  . Mars probes  
  . . **Mars Polar Lander**  
  unmanned spacecraft  
  . space probes  
  . . Mars probes  
  . . . **Mars Polar Lander**  
RT Mars atmosphere  
  Mars Climate Orbiter  
  Mars missions  
  Mars surface  
  Mars Surveyor 98 Program

### Mars Surveyor 98 Lander

USE **Mars Polar Lander**

### Mars Surveyor 98 Orbiter

USE **Mars Climate Orbiter**

### Mars Surveyor 98 Program

(added March 1999)

DEF Mars exploration program consisting of two mission spacecraft—the Mars Climate Orbiter and the Mars Polar Lander. Two surface penetrating microprobes (part of the associated Deep Space 2 mission) for detecting water ice are also piggybacking on the Lander.

GS programs  
  . NASA programs  
  . . NASA space programs  
  . . . **Mars Surveyor 98 Program**  
  . space programs  
  . . NASA space programs  
  . . . **Mars Surveyor 98 Program**  
RT Mars atmosphere  
  Mars Climate Orbiter  
  Mars missions  
  Mars Polar Lander  
  Mars surface

### Mars Surveyor 2001 Mission

(added July 1999)

GS space missions  
  . Mars missions  
  . . **Mars Surveyor 2001 Mission**  
RT Mars environment  
  Mars surface  
  Mars surface samples  
  NASA space programs

### Martian meteorites

USE **SNC meteorites**

### massive compact halo objects

(added November 1999)

DEF Objects, such as brown dwarfs, black holes, and massive planets, hypothesized to

account for the dark matter in the halo of the Milky Way. The signature of these objects is the occasional amplification of the light from extragalactic stars by the gravitational lens effect.

UF *MACHOs (astronomy)*  
GS celestial bodies  
  . **massive compact halo objects**  
RT brown dwarf stars  
  dark matter  
  galactic halos  
  gravitational lenses  
  Milky Way Galaxy  
  missing mass (astrophysics)  
  red dwarf stars

### MEAM (physical chemistry)

USE **embedded atom method**

### meltnerium

(added May 1998)

GS chemical elements  
  . **meltnerium**  
RT hassium

### membership functions

(added December 2000)

DEF Characteristic functions of a fuzzy set, which assign a value indicating the degree of membership for each element in a universal set.

GS functions (mathematics)  
  . **membership functions**  
RT control systems design  
  fuzzy sets  
  fuzzy systems  
  machine learning  
  neural nets

### MEMS (electromechanical devices)

USE **microelectromechanical systems**

### MGS (spacecraft)

USE **Mars Global Surveyor**

### microelectromechanical systems

(added October 1998)

UF *MEMS (electromechanical devices)*  
GS electromechanical devices  
  . **microelectromechanical systems**  
RT electroactive polymers  
  microinstrumentation  
  microminiaturization  
  microminiaturized electronic devices  
  microsatellites  
  nanosatellites  
  nanotechnology  
  piezoelectric actuators  
  piezoelectric motors

### microsatellites

(added October 1998)

DEF Satellites with a total mass between 10 and 100 kg often incorporating miniaturized electronic and mechanical systems.

UF *microsats*  
GS artificial satellites  
  . **microsatellites**  
RT microelectromechanical systems  
  microminiaturization  
  microminiaturized electronic devices  
  nanosatellites  
  satellite constellations  
  satellite design  
  small satellite technology  
  small scientific satellites

### microsats

USE **microsatellites**

**Mindlin plate theory**USE **Mindlin plates****Mindlin plates**

(added April 1998)

UF *Mindlin plate theory*  
*Reissner-Mindlin plates*

GS structural members  
 . plates (structural members)  
 . . **Mindlin plates**

RT dynamic structural analysis  
 finite element method  
 free vibration  
 plate theory  
 Reissner theory  
 shear strain  
 structural analysis  
 structural vibration  
 thick plates

**mischmetal**

(added June 1998)

DEF An alloy consisting of a natural mixture of rare-earth metals; used in electrode materials and hydrogen-storage alloys, as a general alloy addition, and in the production of some aluminum alloys and steels.

GS alloys  
 . rare earth alloys  
 . . **mischmetal**

RT alloying  
 aluminum alloys  
 cathodic coatings  
 cerium  
 desorption  
 electrode materials  
 intermetallics  
 steels

**MJO (meteorology)**USE **Madden-Julian Oscillation****modified embedded atom method**USE **embedded atom method****mutagenesis**

(added June 2000)

DEF Induction or development of a genetic mutation via a natural environmental mutagen or through the methods of genetic engineering.

RT deoxyribonucleic acid  
 gene expression  
 genes  
 mutagens  
 mutations  
 radiation effects

**N****nacelle wing configurations**USE **wing nacelle configurations****nanocomposites**

(added December 2000)

GS composite materials  
 . **nanocomposites**

RT aluminum oxides  
 ceramic matrix composites  
 grain size  
 nanocrystals  
 nanostructure (characteristics)  
 particulate reinforced composites  
 polymer matrix composites  
 silicon carbides  
 silicon nitrides

**nanosatellites**

(added October 1998)

DEF Satellites with a total mass smaller than 10 kg incorporating miniaturized electronic and mechanical systems.

UF *nanosats*  
 GS artificial satellites  
 . **nanosatellites**

RT microelectromechanical systems  
 microminiaturization  
 microminiaturized electronic devices  
 microsatellites  
 satellite constellations  
 satellite design  
 small satellite technology  
 small scientific satellites

**nanosats**USE **nanosatellites****nanotechnology**

(added June 2000)

DEF The creation of functional materials, devices, and systems through control of matter on the nanometer-length scale; exploitation of novel phenomena and properties at the nanometer scale.

GS technologies  
 . **nanotechnology**

RT microelectromechanical systems  
 microelectronics  
 nanostructure (characteristics)  
 nanostructures (devices)  
 nanotubes  
 quantum dots  
 quantum electronics  
 quantum wires  
 self assembly

**nanotubes**

(added June 2000)

DEF Nanostructures having a closed, tubular morphology that can be single-walled or multi-walled. The structures are believed to be defect free, leading to high strength despite their low density; and can be either electrically conductive or semiconductive, depending on their helicity.

UF *nanotubules*  
 GS microstructure  
 . nanostructure (characteristics)  
 . . **nanotubes**

RT fullerenes  
 graphite  
 nanostructures (devices)  
 nanotechnology  
 ∞ tubes

**nanotubules**USE **nanotubes****necrosis**

(added October 2000)

DEF One of the two mechanisms by which cell death occurs (the other being the physiological process of APOPTOSIS). A pathological process caused by the progressive degradative action of enzymes that is generally associated with severe cellular trauma. It is characterized by mitochondrial swelling, nuclear flocculation, uncontrolled cell lysis, and ultimately cell death. In general, cell or tissue death caused by disease or injury.

UF *pathological cell death*  
 GS pathological effects  
 . **necrosis**

RT apoptosis  
 cells (biology)

cytology  
 death  
 diseases  
 hypoxia  
 injuries  
 myocardial infarction  
 pathology  
 tissues (biology)

**Next Generation Space Telescope project**

(added December 1999)

DEF Project in the NASA Origins program with the goal of developing a spaceborne observatory to succeed the Hubble Space Telescope after 2005. The telescope is foreseen to have an aperture of 8 meters and be optimized for near infrared wavelengths (0.6–10+ microns) in order to enable the exploration of the most remote high redshift universe.

UF *NGST project*  
 GS programs  
 . projects  
 . . **Next Generation Space Telescope project**

RT astronomical observatories  
 infrared telescopes  
 NASA space programs  
 spaceborne telescopes

**NGST project**USE **Next Generation Space Telescope project****Nozomi Mars Orbiter**

(added August 1998)

DEF A Japanese Mars mission spacecraft designed to study the Martian upper atmosphere and its interaction with the solar wind, and to develop technologies for use in future planetary missions. Specifically, instruments on the spacecraft enable the measurement of the structure, composition and dynamics of the ionosphere; aeronomy effects of the solar wind; the escape of atmospheric constituents; the intrinsic magnetic field; and dust in the upper atmosphere and in-orbit around Mars.

UF *Planet-B spacecraft*  
 GS interplanetary spacecraft  
 . Mars probes  
 . . **Nozomi Mars Orbiter**  
 Japanese spacecraft  
 . **Nozomi Mars Orbiter**  
 unmanned spacecraft  
 . space probes  
 . . Mars probes  
 . . . **Nozomi Mars Orbiter**

RT aeronomy  
 Deimos  
 Phobos  
 planetary atmospheres  
 solar planetary interactions

**O****optical interconnects**

(added June 1998)

GS **optical interconnects**  
 . free-space optical interconnects

RT connectors  
 electric connectors  
 integrated optics  
 optical computers  
 optical switching  
 optoelectronic devices  
 photonics

## orbit determination

### orbit determination

(added December 1998)

#### GS orbit determination

- . airborne range and orbit determination
- . orbit calculation
- . . minimum variance orbit determination
- . . orbital position estimation

RT Global Positioning System  
position errors  
satellite tracking  
space navigation  
spacecraft control  
spacecraft position indicators

## P

### pathological cell death

USE **necrosis**

### PDS (spectroscopy)

USE **photothermal deflection spectroscopy**

### perfectly matched layers

(added July 1998)

DEF In the area of computational electromagnetism, an absorbing boundary condition used for terminating infinite domain calculations in the finite-difference time-domain (FDTD) or finite element methods. The approach has also been extended to the analysis of some problems in acoustics.

UF **PML (electromagnetism)**

GS conditions  
. boundary conditions

. . **perfectly matched layers**

RT computational electromagnetics  
computational grids  
electromagnetic absorption  
electromagnetic scattering  
finite difference theory  
finite element method  
Maxwell equation

### Phaethon (hypothetical planet)

USE **hypothetical planets**

### Phobos spacecraft

(added August 1998)

DEF Two Soviet spacecraft (Phobos 1 and 2, both launched in July 1988) designed to study the plasma environment in the Martian vicinity, the surface and atmosphere of Mars, and the surface composition of the Martian satellite Phobos. Other mission objectives included the study of the interplanetary environment and solar observations.

GS interplanetary spacecraft  
. Mars probes

. . **Phobos spacecraft**  
Soviet spacecraft

. **Phobos spacecraft**  
unmanned spacecraft

. space probes  
. . Mars probes

. . . **Phobos spacecraft**

RT Mars atmosphere  
Mars environment  
Phobos

### photoresists

(added June 2000)

DEF Photosensitive substances that are either rendered soluble or insoluble to chemical etchants when exposed to light, and are used in transferring circuit patterns in the production of integrated circuits.

RT etching  
integrated circuits  
microelectronics  
photolithography  
photomasks  
photopolymers  
photosensitivity

### photothermal deflection spectroscopy

(added November 1998)

UF **PDS (spectroscopy)**

GS spectroscopy

. **photothermal deflection spectroscopy**

RT optical measurement  
photoacoustic spectroscopy  
thermal diffusivity  
thermal lensing

### piezoactuators

USE **piezoelectric actuators**

### piezoelectric actuators

(added January 2001)

DEF Any actuator that uses the piezoelectric effect as a basis for its function.

UF **piezoactuators**

GS actuators

. **piezoelectric actuators**  
electromechanical devices

. **piezoelectric actuators**

RT active control  
microelectromechanical systems  
piezoelectric motors  
piezoelectric transducers  
smart materials  
smart structures  
ultrasonic wave transducers  
vibration damping

### piezoelectric motors

(added January 2001)

DEF Any motor that uses the piezoelectric effect to produce its mechanical output.

UF **piezomotors**

GS electromechanical devices

. electric motors

. . **piezoelectric motors**

motors

. electric motors

. . **piezoelectric motors**

RT microelectromechanical systems  
micromotors  
piezoelectric actuators  
piezoelectric transducers  
ultrasonic wave transducers

### piezomotors

USE **piezoelectric motors**

### pilot opinion ratings

USE **pilot ratings**

### pilot ratings

(added August 1999)

DEF Subjective assessment of the handling and stability characteristics of an aircraft or other flight vehicle.

UF **pilot opinion ratings**

GS flight characteristics

### . pilot ratings

. . Cooper-Harper ratings  
ratings

. **pilot ratings**

. . Cooper-Harper ratings

RT aircraft performance  
assessments  
controllability  
helicopter performance

### planet X

USE **hypothetical planets**

### Planet-B spacecraft

USE **Nozomi Mars Orbiter**

### PML (electromagnetism)

USE **perfectly matched layers**

### Polar Plasma Laboratory

USE **Polar/GGS spacecraft**

### Polar/GGS spacecraft

(added January 2001)

DEF One of two NASA spacecraft in the Global Geospace Science (GGS) initiative and part of the International Solar Terrestrial Physics (ISTP) program. Polar (Polar Plasma Laboratory) measures solar wind entry, ionospheric output, and the depositions of energy into the neutral atmosphere at high latitudes. Imaging instruments make possible the measurement of visible, ultraviolet, and X-ray spectra of the polar caps. The spacecraft was launched in February 1996.

UF **Polar Plasma Laboratory**

GS artificial satellites

. geophysical satellites

. . **Polar/GGS spacecraft**

. scientific satellites

. . **Polar/GGS spacecraft**

RT auroras  
Earth ionosphere  
Earth magnetosphere  
geomagnetism  
plasma waves  
polar cusps  
solar terrestrial interactions  
solar wind  
space plasmas  
space weather  
**Wind/GGS spacecraft**

### Population III stars

(added July 1999)

UF **primordial stars**

GS celestial bodies

. stars

. . **Population III stars**

RT cosmology  
dark matter  
relic radiation  
stellar evolution  
supermassive stars

### preventive maintenance

(added June 2000)

GS maintenance

. **preventive maintenance**  
prevention

. **preventive maintenance**

RT aircraft maintenance  
failure analysis  
inspection  
nondestructive tests  
reliability analysis

*primordial stars*

USE **Population III stars**

*programmed cell death*

USE **apoptosis**

**proportional navigation**

(added July 1998)

GS navigation  
     . **proportional navigation**  
 RT homing  
     interception  
     line of sight  
     missile control  
     proportional control  
     rendezvous guidance  
     terminal guidance

**proton-antiproton interactions**

(added June 1999)

GS particle interactions  
     . elementary particle interactions  
     . . **proton-antiproton interactions**  
 RT annihilation reactions  
     antiprotons  
     high energy interactions  
     matter-antimatter propulsion

**pursuit-evasion games**

(added October 1998)

GS games  
     . **pursuit-evasion games**  
 RT differential games  
     evasive actions  
     interception  
     optimal control  
     pursuit tracking  
     trajectory optimization  
     zero sum games

**Q**

*QHE (electronics)*

USE **quantum Hall effect**

**quantum communication**

(added March 2000)

DEF Any form of communication that depends on coherent quantum-mechanical effects (quantum interference or quantum entanglement) to transmit, protect or authenticate information, or to perform distributed computational tasks.

GS telecommunication  
     . communication  
     . . **quantum communication**  
 RT communication theory  
     optical communication  
     quantum computation

**quantum computation**

(added March 2000)

DEF Any form of information processing that depends on coherent quantum-mechanical effects (quantum interference or quantum entanglement) to perform computational tasks.

UF *quantum computing*  
 GS computation  
     . **quantum computation**  
 RT quantum communication  
     quantum computers  
     quantum cryptography  
     quantum mechanics  
     Turing machines

**quantum computers**

(added March 2000)

DEF Devices capable of performing quantum computations. There are many proposals for the physical basis of quantum computers. The 0 and 1 of a quantum bit (i.e., qubit) could be the ground and excited states of an atom in a linear ion trap; the polarizations of photons interacting in an optical cavity; or the excess of one nuclear spin state over another in a liquid sample in an NMR machine.

GS data processing equipment  
     . computers  
     . . **quantum computers**  
 RT quantum computation

*quantum computing*

USE **quantum computation**

**quantum cryptography**

(added March 2000)

DEF Any form of cryptography that depends for its security on coherent quantum-mechanical effects (quantum interference or quantum entanglement).

GS cryptography  
     . **quantum cryptography**  
 RT computer information security  
     quantum computation

**quantum Hall effect**

(added July 2000)

DEF Phenomenon where the Hall resistance of a two-dimensional electron system at low temperature and high magnetic fields, becomes quantized as  $h/(e^2)$ , where  $h$  is Plank's constant,  $e$  is the electronic charge, and  $j$  is either an integer or a rational fraction.

UF *QHE (electronics)*  
 GS galvanomagnetic effects  
     . Hall effect  
     . . **quantum Hall effect**  
 RT electron gas  
     Hall resistance  
     magnetic effects  
     quantum electronics  
     semiconductor devices  
     superlattices

**R**

*random positioning machines*

USE **clinostats**

**Rayleigh fading**

(added June 2000)

DEF Rapid-fluctuation, small-scale fading resulting from multipath effects, and typically occurring in non-line-of-sight (NLOS) environments.

GS fading  
     . signal fading  
     . . **Rayleigh fading**  
 RT channels (data transmission)  
     mobile communication systems  
     multipath transmission  
     phase shift keying  
     radio signals  
     reception diversity

*RBCC engines*

USE **rocket-based combined-cycle engines**

*red sprites*

USE **sprites (atmospheric physics)**

*Reissner-Mindlin plates*

USE **Mindlin plates**

**renewable energy**

(added December 1998)

GS **renewable energy**  
     . geothermal energy utilization  
     . hydroelectricity  
     . tidepower  
     . waterwave energy  
     . windpower utilization  
 RT bioconversion  
     biomass energy production  
     clean energy  
     energy policy  
     ∞ energy sources  
     energy technology  
     geothermal energy conversion  
     hydrogen-based energy  
     ocean thermal energy conversion  
     solar energy conversion  
     waste utilization  
     waterwave energy conversion

**Ringleb flow**

(added July 1998)

GS fluid flow  
     . compressible flow  
     . . **Ringleb flow**  
     . steady flow  
     . . **Ringleb flow**  
     . two dimensional flow  
     . . **Ringleb flow**  
 RT critical flow  
     subsonic flow  
     transonic flow

**rocket-based combined-cycle engines**

(added August 1999)

DEF Launch vehicle engines that integrate a high specific impulse, low thrust-to-weight, airbreathing engine with a low-impulse, high thrust-to-weight rocket. The engines are often defined by four modes of operation in a single-stage-to-orbit configuration. In the first mode, the engine functions as a rocket-driven ejector. When the rocket engine is switched off, subsonic combustion (mode 2) is present in the ramjet mode. As the vehicle continues to accelerate, supersonic combustion (mode 3) occurs in the ramjet mode. Finally, as the edge of the atmosphere is approached and the engine inlet is closed off, the rocket is reignited and the final ascent to orbit is undertaken in an all-rocket mode (mode 4).

UF *RBCC engines*  
 GS engines  
     . rocket engines  
     . . **rocket-based combined-cycle engines**  
 RT air breathing boosters  
     air breathing engines  
     hybrid propulsion  
     integral rocket ramjets  
     ramjet engines  
     single stage to orbit vehicles  
     spacecraft propulsion  
     supersonic combustion ramjet engines

*Rossi X Ray Timing Explorer*

USE **X Ray Timing Explorer**

*RXTE (satellite)*

USE **X Ray Timing Explorer**

## S

## scarf joints

(added March 1998)

DEF A joint in which the overlapping parts are tapered to form a continuous length, with no increase in dimension at the joint.

GS joints (junctions)

. **scarf joints**

RT bolted joints  
bonded joints  
lap joints  
metal joints  
scarfing

## scene generation

(added July 1998)

GS imaging techniques

. **scene generation**  
simulation

. **scene generation**

RT computer graphics  
flight simulation  
image reconstruction  
scientific visualization  
target simulators

## screech tones

(added March 1998)

DEF Discrete acoustic tones produced by imperfectly expanded supersonic jets. The phenomenon is a result of a resonant feedback condition involving downstream traveling shear-layer disturbances and upstream traveling acoustic waves.

GS elastic waves  
. sound waves  
. . . noise (sound)  
. . . . flow noise  
. . . . aerodynamic noise  
. . . . **screech tones**  
frequencies  
. acoustic frequencies  
. . **screech tones**

RT aeroacoustics  
feedback  
jet aircraft noise  
jet mixing flow  
nozzle flow  
shear layers  
supersonic jet flow  
supersonic nozzles

## seaborgium

(added May 1998)

GS chemical elements

. **seaborgium**

RT bohrium  
dubnium

## Sea-viewing Wide Field-of-view Sensor

(added December 1998)

UF *SeaWiFS*

GS scanners

. ocean color scanner

. . **Sea-viewing Wide Field-of-view  
Sensor**

RT chlorophylls  
Coastal Zone Color Scanner  
ocean surface  
phytoplankton  
remote sensors  
satellite-borne instruments  
water color

## SeaWiFS

USE **Sea-viewing Wide Field-of-view  
Sensor**

## self assembly

(added January 2001)

DEF Coordinated action of independent units to produce a larger structure or to achieve a desired group effect. A strategy for nanofabrication that involves designing molecules and supra-molecular entities so that shape-complementarity or other properties causes them to aggregate into desired structures.

GS assembling

. **self assembly**

RT abiogenesis

∞ assembly  
chemical evolution  
fabrication  
molecular biology  
molecular structure  
monomolecular films  
nanostructure (characteristics)  
nanotechnology  
synthesis (chemistry)

## Service Module (ISS)

(added March 1999)

DEF Primary Russian component of the International Space Station providing an early station living quarters and life support system functions to all early elements. Also provides propulsive attitude control and reboost capability for the early station.

UF *Zvezda Service Module*

GS modules

. space station modules

. . **Service Module (ISS)**

RT International Space Station  
life support systems

## SGR (astronomy)

USE **soft gamma repeaters**

## Shergotty Nakhla Chassigny meteorites

USE **SNC meteorites**

## Shuttle Superlightweight Tank

USE **external tanks**  
**propellant tanks**

## signal-processing-in-the-element detectors

USE **infrared detectors**

## slenderness ratio

USE **aspect ratio**

## SLWT (propellant tank)

USE **external tanks**  
**propellant tanks**

## SMA (image analysis)

USE **spectral mixture analysis**

## smart materials

(added March 1998)

DEF Engineered materials capable of responding to their environment to a significant degree, by virtue of intrinsic properties and/or built-in sensor/actuator elements. Applications of these materials include vibration suppression/isolation, precision positioning, damage detection, and tunable devices.

UF *intelligent materials*

RT actuators  
biomimetics  
composite materials

electrorheological fluids  
electrostriction  
ferroelastic materials  
ferroelasticity  
ferroelectric materials  
ferromagnetic materials  
magnetorheological fluids  
∞ materials  
piezoelectric actuators  
piezoelectric ceramics  
∞ sensors  
shape memory alloys  
smart structures  
vibration damping

## SNC meteorites

(added March 1998)

DEF Meteorites with petrologic characteristics, isotopic signatures, trapped gas compositions, and relatively young crystallization ages (less than 1.3 billion years), which together point to a Martian origin. The name of these meteorites is derived from first three known examples—Shergotty, Nakhla, and Chassigny.

UF *Martian meteorites*

*Shergotty Nakhla Chassigny meteorites*

GS celestial bodies

. meteorites

. . stony meteorites

. . . achondrites

. . . . **SNC meteorites**

RT chassignites

Mars (planet)

Mars surface

nakhlites

shergottites

## soft gamma repeaters

(added January 2000)

DEF A class of x-ray source which emits repeating bright bursts of "soft" or low-energy gamma rays, along with steady x-ray pulsations. By the end of 1999 only a handful of these sources had been identified in our galaxy and in the Large Magellanic Cloud. They are associated with supernova remnants and are thus apparently some kind of young neutron star. One theory holds that these stars are young magnetars (magnetically-powered neutron stars). Bright bursts occur when the evolving, ultra-strong magnetic field stresses the neutron star's solid crust to breaking, in a sudden starquake. X-ray pulsations are due to the rotation of the star, with it's hot surface bright in x-rays.

UF *SGR (astronomy)*

GS celestial bodies

. stars

. . neutron stars

. . . **soft gamma repeaters**

. . . x ray stars

. . . **soft gamma repeaters**

gamma ray sources (astronomy)

. **soft gamma repeaters**

x ray sources

. x ray stars

. . **soft gamma repeaters**

RT gamma ray astronomy

gamma ray bursts

magnetars

supernova remnants

## sonochemistry

USE **ultrasonic processing**

## space station modules

(added November 1998)

GS modules

- . **space station modules**
  - . . Kvant modules
  - . . Priroda module
  - . . Service Module (ISS)
  - . . Unity connecting module
  - . . Zarya control module
- RT air locks
- compartments
- International Space Station
- Mir space station
- orbital assembly
- space erectable structures
- space station structures
- spacecraft modules

## space tourism

(added April 1999)

GS space industrialization

- . **space tourism**
- tourism

- . **space tourism**

RT space commercialization

space transportation

## space weather

(added June 1999)

SN (FOR METEOROLOGICAL CONDITIONS  
RELATED TO THE MIDDLE AND LOWER  
ATMOSPHERES OF NON-EARTH PLANETS  
USE "PLANETARY METEOROLOGY".)

DEF The dynamic, highly variable conditions of the geospace environment that encompasses the sun, the interplanetary medium, and the Earth magnetosphere-ionosphere-thermosphere system. Major contributing factors include variations in the solar wind, solar flares, and solar mass ejections. Effects of space weather phenomena include performance degradation of communication, navigation, and power systems on both spacecraft and ground-based systems; and potential health hazards during extravehicular activity.

RT Advanced Composition Explorer

- aerospace environments
- aerospace safety
- Earth ionosphere
- Earth magnetosphere
- Earth orbital environments
- geomagnetism
- ionospheric disturbances
- magnetic disturbances
- magnetic storms
- Polar/GGS spacecraft
- radiation hazards
- solar activity effects
- solar terrestrial interactions
- space plasmas
- weather

## spectral mixture analysis

(added July 2000)

DEF Linear algebraic method for defining subpixel fractions for each of the spectral endmembers (e.g., ground cover categories) that constitute a mixed-pixel spectral signature.

UF **SMA (image analysis)**

GS discrimination

- . **spectral mixture analysis**
- image analysis

- . **spectral mixture analysis**
- spectrum analysis

- . **spectral mixture analysis**

RT image processing

- pixels
- principal components analysis
- remote sensing
- spectral reflectance

*spectral response*

USE **spectral sensitivity**

## spiral bevel gears

(added May 1999)

GS gears

- . bevel gears

- . **spiral bevel gears**

*SPRITE detectors*

USE **infrared detectors**

## sprites (atmospheric physics)

(added January 2000)

DEF Short-lived luminosities observed at high altitudes above thunderstorms, apparently associated with upward discharges of thunderstorm electricity. They appear as columnar diffuse reddish glows between 30 km and 80 km above ground, lasting tens of milliseconds, following large positive cloud-to-ground lightning strokes.

UF **red sprites**

GS atmospheric radiation

- . sky radiation

- . **sprites (atmospheric physics)**

- electromagnetic radiation

- . light (visible radiation)

- . sky radiation

- . **sprites (atmospheric physics)**

RT atmospheric electricity

- atmospheric ionization

- cloud-to-ground discharges

- elves

- lightning

- thunderstorms

## Stardust Mission

(added March 1999)

DEF First U.S. mission launched to robotically obtain samples in deep space and return them to Earth. The NASA Discovery-class mission will return dust samples collected from the debris cloud surrounding the nucleus of Comet Wild 2. Interstellar dust will also be collected. The mission spacecraft takes advantage of an Earth gravity-assist maneuver to reach the comet, and uses an aerogel-based dust collector.

GS space missions

- . flyby missions

- . **Stardust Mission**

RT comet nuclei

- interstellar matter

- Wild 2 comet

## stepped leaders

(added August 1999)

GS electric current

- . electric discharges

- . lightning

- . . . leaders (meteorology)

- . . . **stepped leaders**

## Submillimeter Wave Astronomy Satellite

(added November 2000)

DEF A NASA Small Explorer Project (SMEX) satellite designed to study the chemical composition, energy balance, and structure of interstellar gas clouds and the processes that lead to the formation of stars and planets. Its primary objective is to survey water, molecular oxygen, carbon, and isotopic carbon monoxide emission in a variety of galactic star forming regions.

UF **Explorer 74 satellite**

**SWAS (satellite)**

GS artificial satellites

- . scientific satellites

- . . astronomical satellites

- . . **Submillimeter Wave Astronomy Satellite**

- . . Explorer satellites

- . . **Submillimeter Wave Astronomy Satellite**

- . . small scientific satellites

- . . **Submillimeter Wave Astronomy Satellite**

- observatories

- . astronomical observatories

- . astronomical satellites

- . . **Submillimeter Wave Astronomy Satellite**

RT interstellar chemistry

- interstellar matter

- molecular clouds

- spaceborne astronomy

- star formation

- submillimeter waves

## Sunyaev-Zeldovich effect

(added July 2000)

DEF Compton scattering of microwave radiation in the vicinity of galaxy clusters resulting in fluctuations in the cosmic microwave background radiation (CMBR).

UF **S-Z effect**

RT anisotropy

- Compton effect

- cosmic gases

- cosmic microwave background radiation

- ∞ effects

- galactic clusters

- intergalactic media

- microwave scattering

- radio astronomy

- relic radiation

## superhumps (astronomy)

(added October 1998)

RT accretion disks

- astronomical photometry

- binary stars

- cataclysmic variables

- dwarf novae

- eclipsing binary stars

- stellar spectrophotometry

**SWAS (satellite)**

USE **Submillimeter Wave Astronomy Satellite**

**S-Z effect**

USE **Sunyaev-Zeldovich effect**

# T

## Taguchi methods

(added September 2000)

DEF Quality engineering methodology, developed by Genichi Taguchi, for minimizing a product's sensitivity to uncontrollable system disturbances by simultaneously varying both design and disturbance parameters. The method incorporates a special set of arrays called orthogonal arrays that define the minimal number of experiments that would provide the full information for all factors that affect the performance parameter.

GS quality control

- . **Taguchi methods**

RT design analysis

- experiment design

## tensegrity structures

multidisciplinary design optimization  
optimization  
parameter identification  
reliability engineering  
statistical analysis  
total quality management

### *tensegric structures*

USE **tensegrity structures**

### **tensegrity structures**

(added January 2001)

DEF A class of prestressed structures whose shape is guaranteed by the interaction between a continuous network of members in tension and a discontinuous network of members in compression. These members can serve simultaneously as sensors, actuators, and load carrying elements. The word tensegrity is a contraction of "tensional integrity".

UF *tensegric structures*  
*tensile-integrity structures*  
RT isotensoid structures  
prestressing  
smart structures  
structural design  
∞ structures

### *tensile-integrity structures*

USE **tensegrity structures**

### **Terra spacecraft**

(added June 1999)

DEF First in a series of EOS (Earth Observing System) spacecraft developed to advance the understanding of the ways that the Earth's lands, oceans, air, ice, and life function as a total environmental system. The spacecraft carries five high-resolution instruments: the Advanced Spaceborne Thermal Emission Radiometer (ASTER), the Clouds and the Earth Radiant Energy System (CERES), the Multi-Angle Imaging Spectroradiometer (MISR), the Moderate Resolution Imaging Spectroradiometer (MODIS), and the Measurements of Pollution in the Troposphere (MOPITT) instrument.

UF *AM-1 (EOS) spacecraft*  
*EOS AM-1 spacecraft*  
GS artificial satellites  
. **Terra spacecraft**  
Earth Observing System (EOS)  
. **Terra spacecraft**  
RT Earth observations (from space)  
remote sensing

### *thermal lenses*

USE **thermal lensing**

### **thermal lensing**

(added November 1998)

UF *thermal lenses*  
GS **thermal lensing**  
. thermal blooming  
RT atmospheric optics  
focusing  
laser beams  
photothermal deflection spectroscopy  
wave front deformation

### **thermoacoustic effects**

(added May 2000)

DEF Phenomena associated with the combination of temperature, pressure and displacement oscillations caused by acoustic waves interacting with solid boundaries, such as the walls of a tube or a "stack".

RT acoustic excitation

acoustic instability  
acoustics  
acousto-optics  
combustion stability  
∞ effects  
heat transfer  
sound waves  
thermoacoustic refrigerators  
thermophysical properties

### **thermoacoustic refrigerators**

(added May 2000)

DEF Cooling devices in which intense sound waves in pressurized resonant cavities are used to generate temperature gradients in an array of parallel plates in the interior of a tube that serves as a heat exchanger and in which heat is drawn away by a heat sink.

GS refrigerating machinery  
. refrigerators  
. **thermoacoustic refrigerators**  
RT cooling systems  
refrigerating  
thermoacoustic effects

### **thermocapillary migration**

(added September 1999)

DEF Phenomenon where droplets (or bubbles) in a host fluid with a uniform temperature gradient migrate to the hot end of the host fluid because of the temperature dependence of the interfacial energy of the droplets.

RT bubbles  
capillary flow  
drops (liquids)  
electromigration  
interfacial tension  
Marangoni convection  
microgravity  
space processing  
temperature gradients  
thermomigration

### **time domain analysis**

(added April 1999)

GS analysis (mathematics)  
. **time domain analysis**  
. finite difference time domain method  
RT control systems design  
dynamic response  
parameter identification  
signal processing  
∞ time response

### **time synchronization**

(added December 1998)

GS synchronism  
. **time synchronization**  
RT clocks  
frequency standards  
frequency synchronization  
Global Positioning System  
time measurement  
time signals  
universal time

### **tissue engineering**

(added October 2000)

DEF Discipline for the in vitro growth and maintenance of tissue, organ primordia, or the whole or part of an organ so as to preserve its architecture and/or function. In terms of application, the primary goal of this technology is the replacement of deficient organs.

GS bioengineering  
. **tissue engineering**  
technologies

. biotechnology  
. **tissue engineering**  
RT bioreactors  
cells (biology)  
clinostats  
culture techniques  
cytology  
growth  
histology  
in vitro methods and tests  
∞ microgravity applications  
organs  
tissues (biology)

### **Titan 4B launch vehicle**

(added October 1998)

GS launch vehicles  
. Titan launch vehicles  
. Titan 4 launch vehicle  
. **Titan 4B launch vehicle**  
rocket vehicles  
. multistage rocket vehicles  
. Titan launch vehicles  
. Titan 4 launch vehicle  
. **Titan 4B launch vehicle**  
RT Cassini mission  
laser gyroscopes

### **total impulse**

(added March 2000)

DEF The integral of thrust over a given interval of time; the product of thrust and duration expressed in force-seconds; the total thrust produced by a rocket engine or motor over the entire time that its fuel is burning.

GS impulses  
. **total impulse**  
RT propulsion system performance  
propulsive efficiency  
spacecraft propulsion  
specific impulse  
thrust

### **tourism**

(added April 1999)

GS **tourism**  
. space tourism  
RT industries  
recreation  
transportation  
∞ travel

### *TRACE satellite*

USE **Transition Region and Coronal Explorer**

### *transition elements (chemistry)*

USE **transition metals**

### **Transition Region and Coronal Explorer**

(added May 1998)

DEF Small Explorer Mission satellite supporting the investigation of the relationships between fine-scale magnetic fields and their associated plasma structures in the transition region and lower corona of the Sun.

UF *Explorer 73 satellite*  
*TRACE satellite*  
GS artificial satellites  
. scientific satellites  
. Explorer satellites  
. **Transition Region and Coronal Explorer**  
. small scientific satellites  
. **Transition Region and Coronal Explorer**  
RT chromosphere



SOHO Mission  
solar atmosphere  
solar corona  
solar magnetic field  
solar observatories  
solar physics  
solar transition region

#### transplutonic planets

USE **hypothetical planets**

#### transverse momentum

(added June 1999)

GS momentum  
    **transverse momentum**  
RT angular momentum  
    elementary particle interactions  
    particle motion  
    transverse acceleration

#### Trefftz method

(added July 1998)

DEF Boundary-type approximation scheme for the solution of boundary value problems for partial differential equations.

UF *hybrid-Trefftz finite element method*  
GS analysis (mathematics)  
    . numerical analysis  
    . approximation  
    . boundary element method  
    . **Trefftz method**  
RT bending theory  
    boundary conditions  
    boundary value problems  
    finite element method  
    partial differential equations  
    plate theory  
    structural analysis

#### TRMM satellite

(added May 1998)

DEF Satellite supporting the joint US-Japanese Tropical Rainfall Measuring Mission (TRMM) to explore tropical rainfall and its effects on the Earth energy budget, general circulation, and climate. The TRMM satellite represents the first dual deployment of a precipitation radar and passive microwave radiometer on an Earth-viewing satellite.

UF *Tropical Rainfall Measuring Mission sat*  
GS artificial satellites  
    . meteorological satellites  
    . **TRMM satellite**  
    . scientific satellites  
    . **TRMM satellite**  
RT atmospheric circulation  
    Earth radiation budget  
    equatorial atmosphere  
    rain  
    tropical meteorology

#### Trojan asteroids

(added August 2000)

DEF Any asteroid that orbits in the Lagrange points of another (larger) body. In particular, those asteroids with a revolution period approximately equal to that of Jupiter (1:1 resonance) and clustered at either of the two Lagrange points—60 degrees ahead of or behind the Jupiter. Most asteroids of this group are named after the heroes of the Trojan War.

GS celestial bodies  
    . asteroids  
    . **Trojan asteroids**  
RT Jupiter (planet)  
    Lagrangian equilibrium points

three body problem  
Trojan orbits

#### Tropical Rainfall Measuring Mission sat

USE **TRMM satellite**

## U

#### Ukrainian space program

(added January 1999)

GS programs  
    . space programs  
    . **Ukrainian space program**  
RT Ukraine  
    Zenit launch vehicles

#### ultrasonic processing

(added June 1998)

DEF The use of ultrasonic radiation to synthesize a compound or material, or alter the structure, properties, or form of a material.

UF *sonochemistry*  
    *ultrasonic treatment*  
RT  $\infty$  processing  
    ultrasonic cleaning  
    ultrasonics

#### ultrasonic treatment

USE **ultrasonic processing**

#### uncertain systems

(added June 2000)

RT control systems design  
    control theory  
    fuzzy systems  
    linear systems  
    nonlinear systems  
    probability theory  
     $\infty$  systems

#### undercooling

USE **supercooling**

#### Unity connecting module

(added November 1998)

DEF Component of the International Space Station providing six ports that serve as connecting points for other station modules and framework elements.

GS modules  
    . space station modules  
    . **Unity connecting module**  
RT Integrated Truss Structure Z1  
    International Space Station  
    spacecraft docking

## V

#### Variable Specific Impulse Magnetoplasma Rocket

USE **VASIMR (propulsion system)**

#### VASIMR (propulsion system)

(added November 2000)

DEF A high-power, RF-driven magnetoplasma rocket system capable of I(sp) thrust modulation at constant power. The VASIMR utilizes radiofrequency (RF) power both to generate a high-density plasma in a helicon source and to accelerate the plasma ions to high velocity by ion cyclotron resonance heating (ICRH). The system features a magnetic nozzle,

which accelerates the plasma particles by converting their azimuthal energy into directed momentum.

UF *Variable Specific Impulse Magnetoplasma Rocket*  
GS engines  
    . rocket engines  
    . electric rocket engines  
    . electrothermal engines  
    . plasma engines  
    . **VASIMR (propulsion system)**  
    plasma power sources  
    . plasma engines  
    . **VASIMR (propulsion system)**  
RT magnetic nozzles  
    plasma heating  
    plasma propulsion  
    radio frequency heating  
    spacecraft propulsion

#### VentureStar launch vehicle

(added June 1999)

DEF Reusable single-stage-to-orbit launch vehicle employing linear aerospike engines, and having a payload capacity roughly equivalent to that of the Space Shuttle; developed in coordination with the X-33 advanced technology demonstrator vehicle.

GS aerospace vehicles  
    . aerospace planes  
    . **VentureStar launch vehicle**  
    maneuverable spacecraft  
    . aerospace planes  
    . **VentureStar launch vehicle**  
    reentry vehicles  
    . recoverable spacecraft  
    . reusable spacecraft  
    . aerospace planes  
    . **VentureStar launch vehicle**  
    soft landing spacecraft  
    . aerospace planes  
    . **VentureStar launch vehicle**  
RT aerospike engines  
    commercial spacecraft  
    X-33 reusable launch vehicle

#### very large transport aircraft

(added November 1998)

DEF Aircraft capable of a maximum takeoff weight greater than 400 metric tons (881,600 lbs) or having a seating capacity greater than 660.

UF *VLTA (aircraft)*  
GS transport aircraft  
    . **very large transport aircraft**  
RT cargo aircraft  
    passenger aircraft

#### video conferencing

(added August 2000)

UF *video teleconferencing*  
GS telecommunication  
    . teleconferencing  
    . **video conferencing**  
    . video communication  
    . **video conferencing**  
RT communication networks  
    conferences  
    television systems  
    video compression  
    video data

#### video teleconferencing

USE **video conferencing**

#### VLTA (aircraft)

USE **very large transport aircraft**

## volatile organic compounds

VOC (*organic chemistry*)

USE **volatile organic compounds**

### volatile organic compounds

(added March 2000)

DEF Any compounds of carbon (excluding carbon oxides, carbonic acid, metallic carbonates and carbides, and carbon-nitrogen compounds) that are readily vaporizable; any of such compounds that participate in atmospheric photochemical reactions, or that are considered indoor, local, regional, or global contaminants.

UF VOC (*organic chemistry*)

GS organic compounds

. **volatile organic compounds**

RT air pollution

air quality

contaminants

exhaust emission

indoor air pollution

ozone

photochemical reactions

### Voronoi diagrams

(added October 2000)

DEF In computational geometry, a partitioning of a space containing a finite set of points, P, in such a way that each partition contains a single point in P and the subspace for which it is the nearest point from the set. Some applications include regional planning, image analysis, and robot path planning.

GS diagrams

. **Voronoi diagrams**

RT computational geometry

geometry

grid generation (mathematics)

image analysis

partitions (mathematics)

spatial distribution

topology

trajectory planning

## W

### water sampling

(added March 1998)

DEF The process of obtaining a representative sample of water from any natural or artificial environment.

GS sampling

. **water sampling**

RT environmental monitoring

ground water

pollution monitoring

sea water

surface water

water

water pollution

water quality

### wave rotors

(added March 1998)

DEF Rotor devices that use gasdynamic waves to transfer energy rather than the motion of solid surfaces. Typically, they consist of a series of passages arranged on a drum which rotates about an axis. Through rotation, the ends of the passages are periodically exposed to various circumferentially arranged ports which initiate the traveling expansion or compression waves within the passages. The particular circumferential

location of the ports determines the thermodynamic cycle of the working fluid.

GS rotating bodies

. rotors

. . **wave rotors**

RT compression waves

energy transfer

engine parts

gas dynamics

gas generators

gas turbine engines

topping cycle engines

turbomachinery

turboshafts

wave generation

### weakly interacting massive particles

(added November 1999)

DEF Hypothetical elementary particles predicted by supersymmetry theories, that interact only through gravity and weak-type interactions; postulated to account for dark matter in the Universe.

UF *cosmions*

*WIMPs (astronomy)*

GS particles

. elementary particles

. . hypothetical particles

. . . **weakly interacting massive particles**

RT dark matter

missing mass (astrophysics)

solar neutrinos

### WIG vehicles

USE **wing-in-ground effect vehicles**

### Wild 2 comet

(added March 1999)

DEF Periodic comet, discovered January 1978, relatively new to the inner Solar System due to a shift in its orbit caused by the gravitational influence of Jupiter.

GS celestial bodies

. comets

. . **Wild 2 comet**

RT Stardust Mission

### WIMPs (astronomy)

USE **weakly interacting massive particles**

### Wind/GGS spacecraft

(added January 2001)

DEF One of two NASA spacecraft in the Global Geospace Science (GGS) initiative and part of the International Solar Terrestrial Physics (ISTP) program. The main purpose of the Wind spacecraft is to measure the incoming solar wind, magnetic fields, and particles, although early in its mission Wind observed the Earth foreshock region. The spacecraft was launched in November 1994.

GS artificial satellites

. geophysical satellites

. . **Wind/GGS spacecraft**

. . scientific satellites

. . **Wind/GGS spacecraft**

RT Earth magnetosphere

gamma rays

interplanetary magnetic fields

Polar/GGS spacecraft

solar corpuscular radiation

solar terrestrial interactions

solar wind

space plasmas

*wing-body and tail configurations*

USE **body-wing and tail configurations**

*wing-body configurations*

USE **body-wing configurations**

### wing-in-ground effect vehicles

(added December 1999)

DEF Vehicles designed to fly about half their mean chord above the surface, taking advantage of the reduced drag and increased lift caused by ground effect. These vehicles, also known as WIGs or WIGEs, normally operate above a water surface.

UF *ekranoplanes*

*WIG vehicles*

GS ground effect machines

. **wing-in-ground effect vehicles**

RT ground effect (aerodynamics)

surface effect ships

## X

*X Ray Multi-Mirror Mission*

USE **XMM-Newton telescope**

### X-32 aircraft

(added October 1998)

DEF Experimental supersonic strike fighter developed to be configured as a conventional or short takeoff/vertical landing vehicle. Developed as part of the Joint Strike Fighter (JSF) program.

GS Boeing aircraft

. **X-32 aircraft**

jet aircraft

. **X-32 aircraft**

research vehicles

. research aircraft

. . **X-32 aircraft**

supersonic aircraft

. **X-32 aircraft**

V/STOL aircraft

. **X-32 aircraft**

### X-35 aircraft

(added October 1998)

DEF Experimental strike fighter incorporating a vertical lift fan for short takeoff/vertical landing capability. Developed as part of the Joint Strike Fighter (JSF) program.

GS jet aircraft

. **X-35 aircraft**

Lockheed aircraft

. **X-35 aircraft**

research vehicles

. research aircraft

. . **X-35 aircraft**

V/STOL aircraft

. **X-35 aircraft**

### X-37 vehicle

(added March 2000)

DEF NASA/Boeing experimental space plane developed to demonstrate airframe, propulsion, and operations technologies for reduced-cost reusable launch vehicles. The unpiloted X-37 can be carried into orbit by the Space Shuttle or launched by an expendable rocket, and flies in both orbital and reentry environments, operating at speeds up to 25 times the speed of sound.

GS aerospace vehicles

. aerospace planes

. . **X-37 vehicle**

hypersonic vehicles

. **X-37 vehicle**

## Z

maneuverable spacecraft

. aerospace planes

. . . **X-37 vehicle**

reentry vehicles

. recoverable spacecraft

. . reusable spacecraft

. . . aerospace planes

. . . . **X-37 vehicle**

research vehicles

. **X-37 vehicle**

soft landing spacecraft

. aerospace planes

. . **X-37 vehicle**

RT reusable launch vehicles

∞ spacecraft

### X-43 vehicle

(added September 1999)

DEF The experimental research vehicle of the NASA Hyper-X program designed to flight validate key propulsion and related technologies for air-breathing hypersonic aircraft.

GS aerospace vehicles

. **X-43 vehicle**

hypersonic vehicles

. **X-43 vehicle**

research vehicles

. **X-43 vehicle**

RT hypersonic flight

Pegasus air-launched booster

supersonic combustion ramjet engines

### XMM (telescope)

USE **XMM-Newton telescope**

### XMM-Newton telescope

(added August 2000)

DEF Spaceborne x-ray telescope, launched in December 1999, providing simultaneous, high-throughput non-dispersive spectroscopic imaging (EPIC instrument), medium-resolution dispersive spectroscopy (Reflection Grating Spectrometer), and optical/UV imaging and timing from a co-aligned instrument (Optical Monitor).

UF *X Ray Multi-Mirror Mission*

*XMM (telescope)*

GS artificial satellites

. ESA satellites

. . **XMM-Newton telescope**

. scientific satellites

. . astronomical satellites

. . . **XMM-Newton telescope**

ESA spacecraft

. ESA satellites

. . **XMM-Newton telescope**

observatories

. astronomical observatories

. . astronomical satellites

. . . **XMM-Newton telescope**

telescopes

. spaceborne telescopes

. . **XMM-Newton telescope**

. x ray telescopes

. . **XMM-Newton telescope**

RT x ray astronomy

X Ray Astrophysics Facility

### Z1 truss structure

USE **Integrated Truss Structure Z1**

### Zarya control module

(added November 1998)

DEF Component of the International Space Station providing propulsion, steering, and communications during the early assembly stages of the station; later serving as a docking port and fuel tank. Zarya was built by Russia under contract to the U.S. and is owned by the U.S.

GS modules

. space station modules

. . **Zarya control module**

RT International Space Station

### Zenit launch vehicles

(added January 1999)

GS launch vehicles

. **Zenit launch vehicles**

RT sea launching

Ukrainian space program

### zero sum games

(added October 1998)

GS games

. **zero sum games**

RT differential games

Markov processes

optimal control

pursuit-evasion games

saddle points (game theory)

### Zvezda Service Module

USE **Service Module (ISS)**



# NASA THESAURUS SUPPLEMENT

## PART 2 ROTATED TERM DISPLAY

### NUMERALS

AM- 1 (EOS) spacecraft  
*use* Terra spacecraft

Deep Space 1 Mission

Envisat- 1 satellite

EOS AM- 1 spacecraft  
*use* Terra spacecraft

Wild 2 comet

H- 2 control

Delta 3 launch vehicle

Delta 4 launch vehicle

Titan 4B launch vehicle

GOES 10

X- 32 aircraft

X- 35 aircraft

X- 37 vehicle

X- 43 vehicle

Explorer 71 satellite  
*use* Advanced Composition Explorer

Explorer 73 satellite  
*use* Transition Region and Coronal Explorer

Explorer 74 satellite  
*use* Submillimeter Wave Astronomy Satellite

Explorer 77 satellite  
*use* Far UV Spectroscopic Explorer

Explorer 78 satellite  
*use* IMAGE satellite

Mars Surveyor 98 Lander  
*use* Mars Polar Lander

Mars Surveyor 98 Orbiter  
*use* Mars Climate Orbiter

Mars Surveyor 98 Program

Boeing 717 aircraft

Mars Surveyor 2001 Mission

### A

carrier sense multiple **access**

**ACE** satellite  
*use* Advanced Composition Explorer

piezoelectric **actuators**

content- **addressable** memory  
*use* associative memory

**Advanced** Composition Explorer

Darkstar unmanned **aerial** vehicle  
*use* pilotless aircraft  
*use* reconnaissance aircraft

**aeroshells**

machine **aided** indexing  
*use* indexing (information science)

Boeing 717 **aircraft**

very large transport **aircraft**  
**(aircraft)**  
*use* very large transport aircraft

X-32 **aircraft**

X-35 **aircraft**

greedy **algorithms**

**Alpha** Magnetic Spectrometer

iron **aluminides**

**AM-1** (EOS) spacecraft  
*use* Terra spacecraft

EOS **AM-1** spacecraft  
*use* Terra spacecraft

**AMS** (spectrometer)  
*use* Alpha Magnetic Spectrometer

cost benefit **analysis**  
*use* cost analysis  
*use* cost effectiveness

frequency domain **analysis**

information **analysis**

SMA (image **analysis**)  
*use* spectral mixture analysis

spectral mixture **analysis**

time domain **analysis**

**anisoplanatism**

Laser Interferometer Space **Antenna**  
*use* LISA (observatory)

**antenna** gain

**anticoincidence** detectors

**anticoincidence** shields  
*use* anticoincidence detectors

**antiphase** boundaries

**antiphase** domains  
*use* antiphase boundaries

proton- **antiproton** interactions

**APB** (materials)  
*use* antiphase boundaries

**apoptosis**

**archaeomagnetism**  
*use* paleomagnetism

field-programmable gate **arrays**

self **assembly**

**associative** memory

**associative** storage  
*use* associative memory

Trojan **asteroids**

CMBR **(astronomy)**  
*use* cosmic microwave background radiation

MACHOs **(astronomy)**  
*use* massive compact halo objects

SGR **(astronomy)**  
*use* soft gamma repeaters

superhumps **(astronomy)**

WIMPs **(astronomy)**  
*use* weakly interacting massive particles

Submillimeter Wave **Astronomy** Satellite

Chandra X Ray **Astrophysics** Facility  
*use* X Ray Astrophysics Facility

sprites **(atmospheric** physics)

embedded **atom** method

modified embedded **atom** method  
*use* embedded atom method

Imager for Magnetopause-to- **Aurora** Global Explorer

**automatic** indexing  
*use* indexing (information science)

## B

Planet- **B** spacecraft  
*use* Nozomi Mars Orbiter  
 cosmic microwave **background** radiation  
 kink **bands**  
 rocket- **based** combined-cycle engines  
 lithium **batteries**  
 Euler-Bernoulli **beam** theory  
*use* Euler-Bernoulli beams  
 Euler-Bernoulli **beams**  
 cost **benefit** analysis  
*use* cost analysis  
 cost effectiveness  
 Euler- **Bernoulli** beam theory  
*use* Euler-Bernoulli beams  
 Euler- **Bernoulli** beams  
**bevel** gears  
 spiral **bevel** gears  
**biomass** burning  
**biomimetics**  
**Biot-Savart** law  
 wing- **body** and tail configurations  
*use* body-wing and tail configurations  
 wing- **body** configurations  
*use* body-wing configurations  
**Boeing** 717 aircraft  
**bohrium**  
**Bond** number  
 Hale- **Bopp** comet  
 antiphase **boundaries**  
 biomass **burning**

## C

digital **cameras**  
**carrier** sense multiple access  
**cascode** devices  
 pathological **cell** death  
*use* necrosis  
 programmed **cell** death  
*use* apoptosis  
**cellular** manufacturing  
*use* group technology (manufacturing)  
**chain** reactions (chemistry)  
**chain** reactions (nuclear physics)  
**Chandra** X Ray Astrophysics Facility  
*use* X Ray Astrophysics Facility  
 Shergotty Nakhla **Chassigny** meteorites  
*use* SNC meteorites  
 chain reactions **(chemistry)**  
 EAM (physical **chemistry)**  
*use* embedded atom method  
 MEAM (physical **chemistry)**  
*use* embedded atom method  
 transition elements **(chemistry)**  
*use* transition metals  
 VOC (organic **chemistry)**  
*use* volatile organic compounds  
**clamped** structures  
 environmental **cleanup**  
 Mars **Climate** Orbiter  
**clinorotation**  
**clinostat** rotation  
*use* clinorotation

## clinostating

*use* clinorotation

## clinostats

cloud-to- **cloud** discharges

## cloud-to-ground discharges

## CMBR (astronomy)

*use* cosmic microwave background radiation

## cochannel interference

rocket-based **combined-cycle** engines

Hale-Bopp **comet**

Wild 2 **comet**

## Comet Nucleus Tour

e- **commerce**

*use* electronic commerce

electronic **commerce**

free-space optical **communication**

quantum **communication**

massive **compact** halo objects

Advanced **Composition** Explorer

enantiomeric **compounds**

*use* enantiomers

volatile organic **compounds**

quantum **computation**

quantum **computers**

quantum **computing**

*use* quantum computation

video **conferencing**

nacelle wing **configurations**

*use* wing nacelle configurations

wing-body **configurations**

*use* body-wing configurations

wing-body and tail **configurations**

*use* body-wing and tail configurations

Unity **connecting** module

**content-addressable** memory

*use* associative memory

## CONTOUR (mission)

*use* Comet Nucleus Tour

H-2 **control**

Zarya **control** module

**Cooper-Harper** ratings

Transition Region and **Coronal** Explorer

**corrugated** waveguides

**cosmic** microwave background radiation

## cosmions

*use* weakly interacting massive particles

**cost** benefit analysis

*use* cost analysis

cost effectiveness

**critical** current

quantum **cryptography**

**cuprates**

critical **current**

rocket-based combined- **cycle** engines

**cycloaddition**

## D

**Darkstar** unmanned aerial vehicle

*use* pilotless aircraft

reconnaissance aircraft

**data** mining

pathological cell **death**

*use* necrosis

programmed cell **death**  
*use* apoptosis  
**Deep Space 1 Mission**  
 photothermal **deflection** spectroscopy  
**deformable** mirrors  
**Delta 3** launch vehicle  
**Delta 4** launch vehicle  
**dendrimers**  
**dendritic** polymers  
*use* dendrimers  
 anticoincidence **detectors**  
 signal-processing-in-the-element **detectors**  
*use* infrared detectors  
 SPRITE **detectors**  
*use* infrared detectors  
 orbit **determination**  
 cascode **devices**  
 MEMS (electromechanical **devices**)  
*use* microelectromechanical systems  
 Voronoi **diagrams**  
**dielectric** loss  
**dielectric** waveguides  
 finite **difference** time domain method  
**differential** games  
**digital** cameras  
 cloud-to-cloud **discharges**  
 cloud-to-ground **discharges**  
 intracloud **discharges**  
 knowledge **discovery**  
*use* data mining  
**document** indexing  
*use* indexing (information science)  
 frequency **domain** analysis  
 time **domain** analysis  
 finite difference time **domain** method  
 antiphase **domains**  
*use* antiphase boundaries  
**DS1** (space mission)  
*use* Deep Space 1 Mission  
**dubnium**

**E**

**e-commerce**  
*use* electronic commerce  
**e-mail**  
*use* electronic mail  
**EAM** (physical chemistry)  
*use* embedded atom method  
**EAP** (polymers)  
*use* electroactive polymers  
 Josephson **effect**  
 quantum Hall **effect**  
 Sunyaev-Zeldovich **effect**  
 S-Z **effect**  
*use* Sunyaev-Zeldovich effect  
 wing-in-ground **effect** vehicles  
 thermoacoustic **effects**  
**ekranoplanes**  
*use* wing-in-ground effect vehicles  
**electroactive** polymers  
**electrochemical** synthesis  
 PML **(electromagnetism)**  
*use* perfectly matched layers  
 MEMS **(electromechanical devices)**  
*use* microelectromechanical systems  
**electronic** commerce

**electronic** structure  
 QHE **(electronics)**  
*use* quantum Hall effect  
**electrosynthesis**  
*use* electrochemical synthesis  
 signal-processing-in-the-hybrid-Trefftz finite **element** detectors  
**element** method  
*use* finite element method  
 Trefftz method  
 transition **elements** (chemistry)  
*use* transition metals  
**elves**  
**embedded** atom method  
 modified **embedded** atom method  
*use* embedded atom method  
**enantiomeric** compounds  
*use* enantiomers  
**enantiomers**  
**enantiomorphs**  
*use* enantiomers  
 exergic **energy**  
*use* exergy  
 renewable **energy**  
 tissue **engineering**  
 RBCC **engines**  
*use* rocket-based combined-cycle engines  
 rocket-based combined-cycle **engines**  
**environmental** cleanup  
**Envisat-1** satellite  
 AM-1 **(EOS )** spacecraft  
*use* Terra spacecraft  
**EOS** AM-1 spacecraft  
*use* Terra spacecraft  
**Ethernet**  
**Euler-Bernoulli** beam theory  
*use* Euler-Bernoulli beams  
**Euler-Bernoulli** beams  
**evanescent** waves  
 pursuit- **evasion** games  
**exergic** energy  
*use* exergy  
**exergy**  
 Advanced Composition **Explorer**  
 Imager for Magnetopause-to-Aurora Global **Explorer**  
*use* IMAGE satellite  
 Rossi X Ray Timing **Explorer**  
*use* X Ray Timing Explorer  
 Transition Region and Coronal **Explorer**  
**Explorer 71** satellite  
*use* Advanced Composition Explorer  
**Explorer 73** satellite  
*use* Transition Region and Coronal Explorer  
**Explorer 74** satellite  
*use* Submillimeter Wave Astronomy Satellite  
**Explorer 77** satellite  
*use* Far UV Spectroscopic Explorer  
**Explorer 78** satellite  
*use* IMAGE satellite  
 knowledge **extraction**  
*use* data mining

## F

Chandra X Ray Astrophysics	<b>Facility</b> <i>use</i> X Ray Astrophysics Facility
Rayleigh	<b>fading</b>
	<b>FDTD</b> (mathematics) <i>use</i> finite difference time domain method
heavy	<b>fermion</b> superconductors
heavy	<b>fermion</b> systems
	<b>ferroelastic</b> materials
	<b>ferroelasticity</b>
	<b>fiber</b> pushout
Sea-viewing Wide	<b>Field</b> of-view Sensor
	<b>field</b> programmable gate arrays
	<b>field</b> tests
Gabor	<b>filters</b>
	<b>finite</b> difference time domain method
hybrid-Trefftz	<b>finite</b> element method <i>use</i> finite element method Trefftz method
in-	<b>flight</b> simulation
Ringleb	<b>flow</b>
	<b>flow</b> noise
magnetorheological	<b>fluids</b>
	<b>free</b> space optical communication
	<b>free</b> space optical interconnects
	<b>frequency</b> domain analysis
	<b>FSOI</b> (integrated optics) <i>use</i> free-space optical interconnects
	<b>fullerides</b>
membership	<b>functions</b>
	<b>FUSE</b> (satellite) <i>use</i> Far UV Spectroscopic Explorer
	<b>fuselage</b> wing stores <i>use</i> wing-fuselage stores
	<b>fusion</b> propulsion
	<b>Gabor</b> filters

## G

	<b>Gabor</b> transformation
antenna	<b>gain</b>
	<b>games</b>
differential	<b>games</b>
pursuit-evasion	<b>games</b>
zero sum	<b>games</b>
soft	<b>gamma</b> repeaters
field-programmable	<b>gate</b> arrays
bevel	<b>gears</b>
spiral bevel	<b>gears</b>
scene	<b>generation</b>
Next	<b>Generation</b> Space Telescope project
	<b>Genesis</b> mission
Polar/	<b>GGS</b> spacecraft
Wind/	<b>GGS</b> spacecraft
Imager for Magnetopause-to-Aurora	<b>Global</b> Explorer <i>use</i> IMAGE satellite
Mars	<b>Global</b> Surveyor
	<b>glucocorticoids</b>
	<b>Godunov</b> method
	<b>GOES</b> 10
Laser Interferometer	<b>Gravitational</b> Wave Observatory <i>use</i> LIGO (observatory)
	<b>greedy</b> algorithms
cloud-to-	<b>ground</b> discharges
wing-in-	<b>ground</b> effect vehicles
	<b>group</b> technology (manufacturing)

## H

	<b>H-2</b> control
	<b>Hale</b> Bopp comet
quantum	<b>Hall</b> effect
	<b>Hall</b> resistance
	<b>Hall</b> thrusters
massive compact	<b>halo</b> objects
	<b>halon</b>
	<b>hardware</b> in-the-loop simulation
	<b>hardware</b> in-the-loop tests <i>use</i> hardware-in-the-loop simulation
Cooper-	<b>Harper</b> ratings
	<b>hassium</b>
	<b>head</b> up tilt
	<b>heavy</b> fermion superconductors
	<b>heavy</b> fermion systems
	<b>heavy</b> metals
	<b>hindcasting</b>
	<b>HUT</b> (physiology) <i>use</i> head up tilt
	<b>hybrid</b> Trefftz finite element method <i>use</i> finite element method Trefftz method
	<b>hydrophobicity</b>
	<b>hyperbranched</b> polymers <i>use</i> dendrimers
	<b>hypothetical</b> particles
Phaethon	<b>(hypothetical)</b> planet <i>use</i> hypothetical planets
	<b>hypothetical</b> planets

## I

Population	<b>III</b> stars
SMA	<b>(image)</b> analysis <i>use</i> spectral mixture analysis
	<b>IMAGE</b> satellite
	<b>Imager</b> for Magnetopause-to-Aurora Global Explorer <i>use</i> IMAGE satellite
total	<b>impulse</b>
Variable Specific	<b>Impulse</b> Magnetoplasma Rocket <i>use</i> VASIMR (propulsion system)
automatic	<b>indexing</b> <i>use</i> indexing (information science)
document	<b>indexing</b> <i>use</i> indexing (information science)
machine aided	<b>indexing</b> <i>use</i> indexing (information science)
	<b>indexing</b> (information science)
	<b>inflight</b> simulation <i>use</i> in-flight simulation
	<b>information</b> analysis
indexing	<b>(information)</b> science)
FSOI	<b>(integrated)</b> optics <i>use</i> free-space optical interconnects
	<b>Integrated</b> Truss Structure Z1
tensile-	<b>integrity</b> structures <i>use</i> tensegrity structures
	<b>intelligent</b> materials <i>use</i> smart materials
weakly	<b>interacting</b> massive particles
proton-antiproton	<b>interactions</b>
	<b>interannual</b> variations <i>use</i> annual variations
	<b>intercalibration</b>
free-space optical	<b>interconnects</b>



optical **interconnects**  
 cochannel **interference**  
 Laser **Interferometer** Gravitational-Wave  
     Observatory  
     *use* LIGO (observatory)  
 Laser **Interferometer** Space Antenna  
     *use* LISA (observatory)  
**intracloud** discharges  
**intraseasonal** oscillations  
     *use* intraseasonal variations  
**intraseasonal** variations  
**ion** optics  
**Iridium** network  
**Iridium** satellites  
     *use* communication satellites  
     Iridium network  
**iron** aluminides  
 Service Module **(ISS)**  
**ISS** (space station)  
     *use* International Space Station

## J

**Java** (programming language)  
 scarf **joints**  
**Josephson** effect  
**Josephson** tunneling  
     *use* Josephson effect  
 Madden- **Julian** Oscillation

## K

**kink** bands  
**kinking**  
**knowledge** discovery  
     *use* data mining  
**knowledge** extraction  
     *use* data mining

## L

Polar Plasma **Laboratory**  
     *use* Polar/GGS spacecraft  
 Mars Polar **Lander**  
 Mars Surveyor 98 **Lander**  
     *use* Mars Polar Lander  
 Java (programming **language)**  
 markup **languages**  
     *use* document markup languages  
 very **large** transport aircraft  
**Laser** Interferometer  
     Gravitational-Wave Observatory  
     *use* LIGO (observatory)  
**Laser** Interferometer Space Antenna  
     *use* LISA (observatory)  
 Delta 3 **launch** vehicle  
 Delta 4 **launch** vehicle  
 Titan 4B **launch** vehicle  
 VentureStar **launch** vehicle  
 Long March **launch** vehicles  
 Zenit **launch** vehicles  
**Laves** phases  
 Biot-Savart **law**  
 perfectly matched **layers**  
 stepped **leaders**

**leaders** (meteorology)  
 thermal **lenses**  
     *use* thermal lensing  
 thermal **lensing**  
**LIGO** (observatory)  
**LISA** (observatory)  
**lithium** batteries  
**Long** March launch vehicles  
**loop** simulation  
**loop** tests  
**loss**  
**Lunar** Prospector

## M

**machine** aided indexing  
     *use* indexing (information science)  
 random positioning **machines**  
     *use* clinostats  
**MACHOs** (astronomy)  
     *use* massive compact halo objects  
**Madden**-Julian Oscillation  
**magnetars**  
**magnetic** nozzles  
 Alpha **Magnetic** Spectrometer  
 Imager for **Magnetopause**-to-Aurora Global  
     Explorer  
     *use* IMAGE satellite  
 Variable Specific Impulse **Magnetoplasma** Rocket  
     *use* VASIMR (propulsion system)  
**magnetorheological** fluids  
**magnetostratigraphy**  
 e- **mail**  
     *use* electronic mail  
 preventive **maintenance**  
 cellular **manufacturing**  
     *use* group technology  
     (manufacturing)  
 group technology **(manufacturing)**  
 Long **March** launch vehicles  
**markup** languages  
     *use* document markup languages  
**Mars** Climate Orbiter  
**Mars** Global Surveyor  
**Mars** missions  
 Nozomi **Mars** Orbiter  
**Mars** Polar Lander  
**Mars** Surveyor 98 Lander  
     *use* Mars Polar Lander  
**Mars** Surveyor 98 Orbiter  
     *use* Mars Climate Orbiter  
**Mars** Surveyor 98 Program  
**Mars** Surveyor 2001 Mission  
**Martian** meteorites  
     *use* SNC meteorites  
**massive** compact halo objects  
 weakly interacting **massive** particles  
 perfectly **matched** layers  
 APB **(materials)**  
     *use* antiphase boundaries  
 ferroelastic **materials**  
 intelligent **materials**  
     *use* smart materials  
 smart **materials**  
 FDTD **(mathematics)**  
     *use* finite difference time domain  
     method

	<b>MEAM</b> (physical chemistry) <i>use</i> embedded atom method
Tropical Rainfall	<b>Measuring Mission</b> sat <i>use</i> TRMM satellite
	<b>meitnerium</b>
	<b>membership</b> functions
associative	<b>memory</b>
content-addressable	<b>memory</b> <i>use</i> associative memory
	<b>MEMS</b> (electromechanical devices) <i>use</i> microelectromechanical systems
heavy	<b>metals</b>
Martian	<b>meteorites</b> <i>use</i> SNC meteorites
Shergotty Nakhla Chassigny	<b>meteorites</b> <i>use</i> SNC meteorites
SNC	<b>meteorites</b>
leaders	<b>(meteorology)</b>
MJO	<b>(meteorology)</b> <i>use</i> Madden-Julian Oscillation
embedded atom	<b>method</b>
finite difference time domain	<b>method</b>
Godunov	<b>method</b>
hybrid-Trefftz finite element	<b>method</b> <i>use</i> finite element method Trefftz method
modified embedded atom	<b>method</b> <i>use</i> embedded atom method
Trefftz	<b>method</b>
Taguchi	<b>methods</b>
in vitro	<b>methods</b> and tests
in vivo	<b>methods</b> and tests
	<b>MGS</b> (spacecraft) <i>use</i> Mars Global Surveyor
	<b>microelectromechanical</b> systems
	<b>microsatellites</b>
	<b>microsats</b> <i>use</i> microsatellites
cosmic	<b>microwave</b> background radiation
thermocapillary	<b>migration</b>
	<b>Mindlin</b> plate theory <i>use</i> Mindlin plates
	<b>Mindlin</b> plates
Reissner-	<b>Mindlin</b> plates <i>use</i> Mindlin plates
data	<b>mining</b>
X Ray Multi-	<b>Mirror</b> Mission <i>use</i> XMM-Newton telescope
deformable	<b>mirrors</b>
	<b>mischmetal</b>
CONTOUR	<b>(mission)</b> <i>use</i> Comet Nucleus Tour
Deep Space 1	<b>Mission</b>
DS1 (space	<b>mission)</b> <i>use</i> Deep Space 1 Mission
Genesis	<b>mission</b>
Mars Surveyor 2001	<b>Mission</b>
Stardust	<b>Mission</b>
X Ray Multi-Mirror	<b>Mission</b> <i>use</i> XMM-Newton telescope
Tropical Rainfall Measuring	<b>Mission</b> sat <i>use</i> TRMM satellite
Mars	<b>missions</b>
spectral	<b>mixture</b> analysis
	<b>MJO</b> (meteorology) <i>use</i> Madden-Julian Oscillation
	<b>modified</b> embedded atom method <i>use</i> embedded atom method
Unity connecting	<b>module</b>

Zarya control	<b>module</b>
Zvezda Service	<b>Module</b> <i>use</i> Service Module (ISS)
Service	<b>Module</b> (ISS)
space station	<b>modules</b>
transverse	<b>momentum</b>
piezoelectric	<b>motors</b>
X Ray	<b>Multi-Mirror</b> Mission <i>use</i> XMM-Newton telescope
carrier sense	<b>multiple</b> access
	<b>mutagenesis</b>

## N

	<b>nacelle</b> wing configurations <i>use</i> wing nacelle configurations
Shergotty	<b>Nakhla</b> Chassigny meteorites <i>use</i> SNC meteorites
	<b>nanocomposites</b>
	<b>nanosatellites</b>
	<b>nanosats</b> <i>use</i> nanosatellites
	<b>nanotechnology</b>
	<b>nanotubes</b>
	<b>nanotubules</b> <i>use</i> nanotubes
proportional	<b>navigation</b>
	<b>necrosis</b>
Iridium	<b>network</b>
XMM-	<b>Newton</b> telescope
	<b>Next</b> Generation Space Telescope project
	<b>NGST</b> project <i>use</i> Next Generation Space Telescope project
flow	<b>noise</b>
	<b>Nozomi</b> Mars Orbiter
magnetic	<b>nozzles</b>
chain reactions	<b>(nuclear</b> physics)
Comet	<b>Nucleus</b> Tour
Bond	<b>number</b>

## O

massive compact halo	<b>objects</b>
Laser Interferometer	
Gravitational-Wave	<b>Observatory</b> <i>use</i> LIGO (observatory)
LIGO	<b>(observatory)</b>
LISA	<b>(observatory)</b>
pilot	<b>opinion</b> ratings <i>use</i> pilot ratings
free-space	<b>optical</b> communication
	<b>optical</b> interconnects
free-space	<b>optical</b> interconnects
FSOI (integrated	<b>optics)</b> <i>use</i> free-space optical interconnects
ion	<b>optics</b>
	<b>orbit</b> determination
Mars Climate	<b>Orbiter</b>
Mars Surveyor 98	<b>Orbiter</b> <i>use</i> Mars Climate Orbiter
Nozomi Mars	<b>Orbiter</b>
VOC	<b>(organic</b> chemistry) <i>use</i> volatile organic compounds
volatile	<b>organic</b> compounds
Madden-Julian	<b>Oscillation</b>

intraseasonal **oscillations**  
*use* intraseasonal variations

## P

hypothetical **particles**  
 weakly interacting massive **particles**  
**pathological** cell death  
*use* necrosis  
**PDS** (spectroscopy)  
*use* photothermal deflection spectroscopy  
**perfectly** matched layers  
**Phaethon** (hypothetical planet)  
*use* hypothetical planets  
 Laves **phases**  
**Phobos** spacecraft  
**photoresists**  
**photothermal** deflection spectroscopy  
 EAM **(physical)** chemistry  
*use* embedded atom method  
 MEAM **(physical)** chemistry  
*use* embedded atom method  
 chain reactions (nuclear **physics**)  
 sprites (atmospheric **physics**)  
 HUT **(physiology)**  
*use* head up tilt  
**piezoactuators**  
*use* piezoelectric actuators  
**piezoelectric** actuators  
**piezoelectric** motors  
**piezomotors**  
*use* piezoelectric motors  
**pilot** opinion ratings  
*use* pilot ratings  
**pilot** ratings  
 Phaethon (hypothetical **planet**)  
*use* hypothetical planets  
**Planet-B** spacecraft  
*use* Nozomi Mars Orbiter  
**planet X**  
*use* hypothetical planets  
 hypothetical **planets**  
 transplutonic **planets**  
*use* hypothetical planets  
 Polar **Plasma** Laboratory  
*use* Polar/GGS spacecraft  
 Mindlin **plate** theory  
*use* Mindlin plates  
 Mindlin **plates**  
 Reissner-Mindlin **plates**  
*use* Mindlin plates  
**PML** (electromagnetism)  
*use* perfectly matched layers  
**Polar/GGS** spacecraft  
 Mars **Polar** Lander  
**Polar** Plasma Laboratory  
*use* Polar/GGS spacecraft  
 dendritic **polymers**  
*use* dendrimers  
 EAP **(polymers)**  
*use* electroactive polymers  
 electroactive **polymers**  
 hyperbranched **polymers**  
*use* dendrimers  
**Population** III stars

random **positioning** machines  
*use* clinostats  
**preventive** maintenance  
**primordial** stars  
*use* Population III stars  
 ultrasonic **processing**  
 signal- **processing**-in-the-element detectors  
 Mars Surveyor 98 **Program**  
 Ukrainian space **program**  
 field- **programmable** gate arrays  
**programmed** cell death  
*use* apoptosis  
 Java **(programming)** language  
 Next Generation Space Telescope **project**  
 NGST **project**  
*use* Next Generation Space Telescope project  
 SLWT **(propellant)** tank  
*use* external tanks  
 propellant tanks  
**proportional** navigation  
 fusion **propulsion**  
 VASIMR **(propulsion)** system  
 Lunar **Prospector**  
**proton**-antiproton interactions  
**pursuit**-evasion games  
 fiber **pushout**

## Q

**QHE** (electronics)  
*use* quantum Hall effect  
**quantum** communication  
**quantum** computation  
**quantum** computers  
**quantum** computing  
*use* quantum computation  
**quantum** cryptography  
**quantum** Hall effect

## R

cosmic microwave background **radiation**  
 Tropical **Rainfall** Measuring Mission sat  
*use* TRMM satellite  
**random** positioning machines  
*use* clinostats  
 Cooper-Harper **ratings**  
 pilot **ratings**  
 pilot opinion **ratings**  
*use* pilot ratings  
 slenderness **ratio**  
*use* aspect ratio  
 Chandra X **Ray** Astrophysics Facility  
*use* X Ray Astrophysics Facility  
 X **Ray** Multi-Mirror Mission  
*use* XMM-Newton telescope  
 Rossi X **Ray** Timing Explorer  
*use* X Ray Timing Explorer  
**Rayleigh** fading  
**RBCC** engines  
*use* rocket-based combined-cycle engines  
 chain **reactions** (chemistry)  
 chain **reactions** (nuclear physics)  
**red** sprites  
*use* sprites (atmospheric physics)

## refrigerators

thermoacoustic **refrigerators**  
 Transition **Region** and Coronal Explorer  
**Reissner**–Mindlin plates  
*use* Mindlin plates  
**renewable** energy  
 soft gamma **repeaters**  
 Hall **resistance**  
 spectral **response**  
*use* spectral sensitivity  
**Ringleb** flow  
 Variable Specific Impulse **Rocket**  
 Magnetoplasma *use* VASIMR (propulsion system)  
**rocket**–based combined-cycle engines  
**Rossi** X Ray Timing Explorer  
*use* X Ray Timing Explorer  
 clinostat **rotation**  
*use* clinorotation  
 wave **rotors**  
**RXTE** (satellite)  
*use* X Ray Timing Explorer

## S

**S**–Z effect  
*use* Sunyaev–Zeldovich effect  
 water **sampling**  
 Tropical Rainfall Measuring Mission **sat**  
*use* TRMM satellite  
 ACE **satellite**  
*use* Advanced Composition Explorer  
 Envisat-1 **satellite**  
 Explorer 71 **satellite**  
*use* Advanced Composition Explorer  
 Explorer 73 **satellite**  
*use* Transition Region and Coronal Explorer  
 Explorer 74 **satellite**  
*use* Submillimeter Wave Astronomy Satellite  
 Explorer 77 **satellite**  
*use* Far UV Spectroscopic Explorer  
 Explorer 78 **satellite**  
*use* IMAGE satellite  
 FUSE **(satellite)**  
*use* Far UV Spectroscopic Explorer  
 IMAGE **satellite**  
 RXTE **(satellite)**  
*use* X Ray Timing Explorer  
 Submillimeter Wave Astronomy **Satellite**  
 SWAS **(satellite)**  
*use* Submillimeter Wave Astronomy Satellite  
 TRACE **satellite**  
*use* Transition Region and Coronal Explorer  
 TRMM **satellite**  
 Iridium **satellites**  
*use* communication satellites  
 Iridium network  
 Biot- **Savart** law  
**scarf** joints  
**scene** generation  
 indexing (information **science**)  
**screech** tones

**Sea**–viewing Wide Field-of-view Sensor  
**seaborgium**  
**SeaWiFS**  
*use* Sea-viewing Wide Field-of-view Sensor  
**self** assembly  
 carrier **sense** multiple access  
 Sea-viewing Wide Field-of-view **Sensor**  
**Service** Module (ISS)  
 Zvezda **Service** Module  
*use* Service Module (ISS)  
**SGR** (astronomy)  
*use* soft gamma repeaters  
**Shergotty** Nakhla Chassigny meteorites  
*use* SNC meteorites  
 anticoincidence **shields**  
*use* anticoincidence detectors  
**Shuttle** Superlightweight Tank  
*use* external tanks  
 propellant tanks  
**signal**–processing-in-the-element detectors  
*use* infrared detectors  
 hardware-in-the-loop **simulation**  
 in-flight **simulation**  
 inflight **simulation**  
*use* in-flight simulation  
**slenderness** ratio  
*use* aspect ratio  
**SLWT** (propellant tank)  
*use* external tanks  
 propellant tanks  
**SMA** (image analysis)  
*use* spectral mixture analysis  
**smart** materials  
**SNC** meteorites  
**soft** gamma repeaters  
**sonochemistry**  
*use* ultrasonic processing  
 Deep **Space** 1 Mission  
 Laser Interferometer **Space** Antenna  
*use* LISA (observatory)  
 DS1 **(space** mission)  
*use* Deep Space 1 Mission  
 free- **space** optical communication  
 free- **space** optical interconnects  
 Ukrainian **space** program  
 ISS **(space** station)  
*use* International Space Station  
**space** station modules  
 Next Generation **Space** Telescope project  
**space** tourism  
**space** weather  
 AM-1 (EOS) **spacecraft**  
*use* Terra spacecraft  
 EOS AM-1 **spacecraft**  
*use* Terra spacecraft  
 MGS **(spacecraft)**  
*use* Mars Global Surveyor  
 Phobos **spacecraft**  
 Planet-B **spacecraft**  
*use* Nozomi Mars Orbiter  
 Polar/GGS **spacecraft**  
 Terra **spacecraft**  
 Wind/GGS **spacecraft**

Variable **Specific** Impulse Magnetoplasma Rocket  
*use* VASIMR (propulsion system)  
**spectral** mixture analysis  
**spectral** response  
*use* spectral sensitivity  
Alpha Magnetic **Spectrometer**  
AMS **(spectrometer)**  
*use* Alpha Magnetic Spectrometer  
PDS **(spectroscopy)**  
*use* photothermal deflection spectroscopy  
photothermal deflection **spectroscopy**  
**spiral** bevel gears  
**SPRITE** detectors  
*use* infrared detectors  
red **sprites**  
*use* sprites (atmospheric physics)  
**sprites** (atmospheric physics)  
**Stardust** Mission  
Population III **stars**  
primordial **stars**  
*use* Population III stars  
ISS (space **station**)  
*use* International Space Station  
space **station** modules  
**stepped** leaders  
associative **storage**  
*use* associative memory  
fuselage-wing **stores**  
*use* wing-fuselage stores  
electronic **structure**  
Z1 truss **structure**  
*use* Integrated Truss Structure Z1  
Integrated Truss **Structure** Z1  
clamped **structures**  
tensegric **structures**  
*use* tensegrity structures  
tensegrity **structures**  
tensile-integrity **structures**  
*use* tensegrity structures  
**Submillimeter** Wave Astronomy Satellite  
zero **sum** games  
**Sunyaev**–Zeldovich effect  
heavy fermion **superconductors**  
**superhumps** (astronomy)  
Shuttle **Superlightweight** Tank  
*use* external tanks  
propellant tanks  
Mars Global **Surveyor**  
Mars **Surveyor** 98 Lander  
*use* Mars Polar Lander  
Mars **Surveyor** 98 Orbiter  
*use* Mars Climate Orbiter  
Mars **Surveyor** 98 Program  
Mars **Surveyor** 2001 Mission  
**SWAS** (satellite)  
*use* Submillimeter Wave Astronomy Satellite  
time **synchronization**  
electrochemical **synthesis**  
VASIMR (propulsion **system**)  
heavy fermion **systems**  
microelectromechanical **systems**  
uncertain **systems**

## T

**Taguchi** methods  
wing-body and **tail** configurations  
*use* body-wing and tail configurations  
Shuttle Superlightweight **Tank**  
*use* external tanks  
propellant tanks  
SLWT (propellant **tank**)  
*use* external tanks  
propellant tanks  
group **technology** (manufacturing)  
video **teleconferencing**  
*use* video conferencing  
XMM **(telescope)**  
*use* XMM-Newton telescope  
XMM-Newton **telescope**  
Next Generation Space **Telescope** project  
**tensegric** structures  
*use* tensegrity structures  
**tensegrity** structures  
**tensile**–integrity structures  
*use* tensegrity structures  
**Terra** spacecraft  
field **tests**  
hardware-in-the-loop **tests**  
*use* hardware-in-the-loop simulation  
in vitro methods and **tests**  
in vivo methods and **tests**  
Euler-Bernoulli beam **theory**  
*use* Euler-Bernoulli beams  
Mindlin plate **theory**  
*use* Mindlin plates  
**thermal** lenses  
*use* thermal lensing  
**thermal** lensing  
**thermoacoustic** effects  
**thermoacoustic** refrigerators  
**thermocapillary** migration  
Hall **thrusters**  
head up **tilt**  
**time** domain analysis  
finite difference **time** domain method  
**time** synchronization  
Rossi X Ray **Timing** Explorer  
*use* X Ray Timing Explorer  
**tissue** engineering  
**Titan** 4B launch vehicle  
screech **tones**  
**total** impulse  
Comet Nucleus **Tour**  
**tourism**  
space **tourism**  
**TRACE** satellite  
*use* Transition Region and Coronal Explorer  
Gabor **transformation**  
**transition** elements (chemistry)  
*use* transition metals  
**Transition** Region and Coronal Explorer  
**transplutonic** planets  
*use* hypothetical planets  
very large **transport** aircraft  
**transverse** momentum  
ultrasonic **treatment**  
*use* ultrasonic processing

hybrid- **Trefftz** finite element method  
*use* finite element method  
 Trefftz method  
**Trefftz** method  
**TRMM** satellite  
**Trojan** asteroids  
**Tropical** Rainfall Measuring Mission  
 sat  
*use* TRMM satellite  
 Z1 **truss** structure  
*use* Integrated Truss Structure Z1  
 Integrated **Truss** Structure Z1  
 Josephson **tunneling**  
*use* Josephson effect

## U

**Ukrainian** space program  
**ultrasonic** processing  
**ultrasonic** treatment  
*use* ultrasonic processing  
**uncertain** systems  
**undercooling**  
*use* supercooling  
**Unity** connecting module  
 Darkstar **unmanned** aerial vehicle  
*use* pilotless aircraft  
 reconnaissance aircraft  
 head **up** tilt

## V

**Variable** Specific Impulse  
 Magnetoplasma Rocket  
*use* VASIMR (propulsion system)  
 interannual **variations**  
*use* annual variations  
 intraseasonal **variations**  
**VASIMR** (propulsion system)  
 Darkstar unmanned aerial **vehicle**  
*use* pilotless aircraft  
 reconnaissance aircraft  
 Delta 3 launch **vehicle**  
 Delta 4 launch **vehicle**  
 Titan 4B launch **vehicle**  
 VentureStar launch **vehicle**  
 X-37 **vehicle**  
 X-43 **vehicle**  
 Long March launch **vehicles**  
 WIG **vehicles**  
*use* wing-in-ground effect vehicles  
 wing-in-ground effect **vehicles**  
 Zenit launch **vehicles**  
**VentureStar** launch vehicle  
**very** large transport aircraft  
**video** conferencing  
**video** teleconferencing  
*use* video conferencing  
 Sea-viewing Wide Field-of- **view** Sensor  
 Sea- **viewing** Wide Field-of-view Sensor  
 in **vitro** methods and tests  
 in **vivo** methods and tests  
**VLTA** (aircraft)  
*use* very large transport aircraft  
**VOC** (organic chemistry)  
*use* volatile organic compounds

**volatile** organic compounds  
**Voronoi** diagrams

## W

**water** sampling  
 Submillimeter **Wave** Astronomy Satellite  
 Laser Interferometer Gravitational- **Wave** Observatory  
*use* LIGO (observatory)  
**wave** rotors  
 corrugated **waveguides**  
 dielectric **waveguides**  
 evanescent **waves**  
**weakly** interacting massive particles  
**weather**  
 space **Wide** Field-of-view Sensor  
 Sea-viewing **WIG** vehicles  
*use* wing-in-ground effect vehicles  
**Wild 2** comet  
**WIMPs** (astronomy)  
*use* weakly interacting massive particles  
**Wind/GGS** spacecraft  
**wing**-body and tail configurations  
*use* body-wing and tail configurations  
**wing**-body configurations  
*use* body-wing configurations  
 nacelle **wing** configurations  
*use* wing nacelle configurations  
**wing**-in-ground effect vehicles  
 fuselage- **wing** stores  
*use* wing-fuselage stores

## X

planet **X**  
*use* hypothetical planets  
**X-32** aircraft  
**X-35** aircraft  
**X-37** vehicle  
**X-43** vehicle  
 Chandra **X** Ray Astrophysics Facility  
*use* X Ray Astrophysics Facility  
**X** Ray Multi-Mirror Mission  
*use* XMM-Newton telescope  
 Rossi **X** Ray Timing Explorer  
*use* X Ray Timing Explorer  
**XMM**-Newton telescope  
**XMM** (telescope)  
*use* XMM-Newton telescope

## Z

S- **Z** effect  
*use* Sunyaev-Zeldovich effect  
 Integrated Truss Structure **Z1**  
**Z1** truss structure  
*use* Integrated Truss Structure Z1  
**Zarya** control module  
 Sunyaev- **Zeldovich** effect  
**Zenit** launch vehicles  
**zero** sum games  
**Zvezda** Service Module  
*use* Service Module (ISS)

# **NASA THESAURUS SUPPLEMENT**

## **PART 3**

### **CHANGES**

No term changes or deletions were made during this period.

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